Francis Xavier Engineering College

(An Autonomous Institution)
Tirunelveli - 627 003
Tamil Nadu India

Department of Artificial Intelligence and Machine Learning

Curriculum and Syllabi – R 2024-UG

CHOICE BASED CREDIT SYSTEM AND OBE

Vision of the Department

To be a Centre of Excellence in Artificial Intelligence and Machine Learning through Innovative Education and Ethical Practices, Empowering Students to address Global Challenges and reach the unreached with cutting-edge technology.

Mission of the Department

- To cultivate a dynamic and innovative learning environment that empowers students and researchers in Artificial Intelligence and Machine Learning.
- To deliver world-class education, promote pioneering research, and foster industry collaborations to drive technological advancement.
- To contribute to building a super knowledge power and achieve global recognition for excellence in AI and ML.

Table of Content

Programme Educational Objectives (PEOs)

PEO 1 **Professional Competence and Innovation**: Graduates will demonstrate strong technical competence and innovative problem-solving skills in Artificial Intelligence and Machine Learning, effectively contributing to the development and implementation of advanced AI/ML solutions in industry, academia, and research institutions.

PEO 2 **Ethical Leadership and Global Impact:** Graduates will exhibit leadership qualities and ethical practices in their professional endeavours, addressing global challenges and making a positive impact on society by leveraging AI/ML technologies to reach the unreached and improve the quality of life.

PEO 3 **Lifelong Learning and Continuous Improvement:** Graduates will engage in lifelong learning and continuous professional development, staying abreast of the latest advancements in AI/ML, and adapting to the evolving technological landscape to maintain their relevance and excellence in the field.

PEO 4 **Interdisciplinary Collaboration and Innovation:** Graduates will actively engage in interdisciplinary collaboration, integrating AI/ML with other fields such as healthcare, finance, agriculture, and environmental science to drive innovative solutions and address complex, real-world problems through a holistic and multi-faceted approach.

Programme Specific Outcomes (PSOs)

PSO_1 **Expertise in AI/ML Techniques and Tools**: Graduates will possess in-depth knowledge and practical skills in applying AI and ML techniques, algorithms, and tools to solve complex problems across various domains, ensuring high performance and accuracy in their solutions.

PSO_2 **Development and Deployment of Intelligent Systems:** Graduates will be capable of designing, developing, and deploying intelligent systems and applications, leveraging machine learning models, neural networks, natural language processing, and other AI technologies to create innovative solutions that meet industry and societal needs.

PSO_3 **Ethical and Responsible AI Practices**: Graduates will demonstrate an understanding of ethical considerations and responsible AI practices, ensuring that the development and implementation of AI/ML systems are aligned with ethical guidelines, fairness, transparency, and accountability to positively impact society and protect user privacy.

Programme Outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‟s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping with PO Vs PEO, PSO

PEO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO1	PSO2	PSO3
PEO1	3	3	3	3	3	3	2	2	1	1	2	2	3	3	2
PEO2	3	3	3	3	3	1	2	1	2	2	2	3	3	3	2
PEO3	3	3	3	3	3	3	3	3	3	3	3	2	1	1	2
PEO4	2	2	2	2	2	3	3	3	3	3	2	2			3

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	PROGRAMME OUTCOMES (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
PEO 1	3	3	3	3	3	3	2	2	1	1	2	2
PEO 2	3	3	3	3	3	1	2	1	2	2	2	3
PEO 3	3	3	3	3	3	3	3	3	3	3	3	2
PEO 4	2	2	2	2	2	3	3	3	3	3	2	2

1→Low 2→Medium 3→High

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Outcomes and the Programme outcomes is given in the following Table

PROGRAMME SPECIFIC OBJECTIVES (PSO)	PROGRAMME OUTCOMES (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
PSO 1	3	3	2	1	1	1	2		1	2		2
PSO 2	3	3	2		1	1				2		2
PSO 3	3	3	2	1	1	1			1	1		2

1→Low 2→Medium 3→High

FRANCIS XAVIER ENGINEERING COLLEGE

B.E. –CSE [ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING]

REGULATIONS 2024

Choice Based Credit System and Outcome Based Education

SUMMARY OF CREDIT DISTRIBUTION

S. No	Category	Credits Per Semester								Total Credits	Credits in %
		I	II	III	IV	V	VI	VII	VIII		
1	HSSM	4	3		2			3		12	7.27%
2	BS	10	4	3	4					21	13.33%
3	ES	8	12							20	14.54%
4	PC		2	16	11	14	11	7		61	34.54%
5	PE					3	6	9		18	10.90%
6	OE			3	3	3	3			12	7.27%
7	EEC		1	1	2	2	3	2	9	20	12.12%
Total		22	22	23	22	22	23	21	9	164	100%

Total Credits: 164

HSSM- Humanities and Social Sciences including Management

BS - Basic Science

ES - Engineering Sciences

PC - Professional Core

PE - Professional Elective

OE - Open Elective/Programme Specific Elective for Expandable Scope

EEC - Employability Enhancement Course

FRANCIS XAVIER ENGINEERING COLLEGE
B.E. –CSE [ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING]

REGULATIONS 2024
Choice Based Credit System and Outcome Based Education
I-VIII Semester Curriculum and Syllabi
SEMESTER I

S. No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24MA1201	Matrices and Multivariable Calculus	**BS**	4	3	1	0	4
2	24PH1301	Applied Physics	**BS**	2	2	0	0	2
3	24CY1401	Applied Chemistry	**BS**	2	2	0	0	2
4	24CS1501	Introduction To Programming With C	**ES**	3	3	0	0	3
5	24AM1601	Artificial Intelligence Essentials	**ES**	2	2	0	0	1
6	24HS1103	Tamil Heritage/தமிழர் மரபு	**HSSM**	2	2	0	0	1
Theory cum Practical Courses								
1	24HS1101	Professional Communication Skills	**HSSM**	4	2	0	2	3
Practical Courses								
1	24PC1311	Applied Physics and Chemistry Laboratory	**BS**	4	0	0	4	2
2	24CS1511	Programming Practice Laboratory using C	**ES**	4	0	0	4	2
3	24GE1511	Engineering Practices Laboratory	**ES**	4	0	0	4	2
			Total	31	16	1	14	**22**

SEMESTER II

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24HS2101	Technical Communication Skills	**HSSM**	2	2	0	0	2
2	24MA2201	Complex Analysis and Fourier Series	**BS**	4	3	1	0	4
3	24CS2501	Introduction to Computing using Python	**ES**	3	3	0	0	3
4	24EE2501	Fundamentals of Electrical and Electronics Engineering	**ES**	3	3	0	0	3
5	24ME1501	Engineering Graphics	**ES**	4	2	0	4	4
6	24GE2901	Design Thinking	**EEC**	1	1	0	0	1
7	24HS2103	Technology in Tamil Culture/தமிழரும் தததொழில்நுட்பமும்	**HSSM**	1	1	0	0	1
Practical Courses								
1	24CS2511	Python Programming Laboratory	**ES**	4	0	0	4	2
			Total	22	15	1	8	**20**

SEMESTER III

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24MA3202	Mathematical Foundation for Data Science	**BS**	4	3	1	0	3
2	24CS3601	Data Structures and algorithms	**PC**	3	3	0	0	3
3	24AM3602	Digital Principles and Computer Organization	**PC**	3	3	0	0	3
4		Open Elective –I (Microcontrollers)	**OE**	3	3	0	0	3
Theory cum Practical Courses								
5	24AM3602	Object Oriented Programming	**PC**	4	2	0	2	3
6	24AM3601	Operating Systems	**PC**	4	2	0	2	3
Practical Courses								
1	24CS3611	Data Structures and algorithms Laboratory	**PC**	4	0	0	4	2
2	24AM3611	Data Analytics and AI Tools Laboratory	**PC**	4	0	0	4	2
3	24PT3902	Soft skills-Verbal Ability	**EEC**	1	0	0	2	1
			Total	30	16	1	**14**	**23**

SEMESTER IV

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24HS4101	Professional Ethics and Human Values	**HSSM**	2	2	0	0	2
2	24MA4201	Discrete Mathematics	**BS**	4	3	1	0	4
3	24CS4601	Database and SQL Programming	**PC**	3	3	0	0	3
4	24IT4601	Automata and Compiler Design	**PC**	3	3	0	0	3
5		Open Elective –II (Networks)	**OE**	3	3	0	0	3
Theory cum Practical Courses								
1	24AM4601	Software Engineering and Devops	**PC**	4	2	0	2	3
Practical Courses								
1	**24CS4611**	Database and SQL Programming Laboratory	**PC**	4	0	0	4	2
2	**24PT3901**	Soft skills-Aptitude - I	**EEC**	1	0	0	2	1
3	**24CS4911**	Design Thinking Project	**EEC**	1	0	0	2	1
			Total	25	16	1	10	**22**

SEMESTER V

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24AM5601	Machine Learning	**PC**	3	3	0	0	3
2	24IT5602	Virtualization and Cloud Computing	**PC**	3	3	0	0	3
3	24AM5603	Cryptography and Security	**PC**	3	3	0	0	3
4	24AM5604	Natural Language Processing	**PC**	3	3	0	0	3
5		Professional Elective I (CV/ Information processing)	**PE**	3	3	0	0	3
6		Open Elective –III (Embedded Systems and IoT)	**OE**	3	3	0	0	3
Practical Courses								
1	24AM5611	Machine Learning Laboratory	**PC**	4	0	0	4	2
2	24HS5911	Communication and Soft skills Laboratory	**EEC**	1	0	0	2	1
3	24PT4901	Soft skills-Aptitude II	**EEC**	1	0	0	2	1
			Total	24	18	0	8	**22**

SEMESTER VI

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24AM6601	Neural Networks and Deep Learning	**PC**	3	3	0	0	3
2	24AM6602	AI and Expert Systems	**PC**	3	3	0	0	3
3	24AM6603	Data Mining and Big Data Analytics	**PC**	3	3	0	0	3
4		Professional Elective II : Robotics and Automation	**PE**	3	3	0	0	3
5		Professional Elective III :Optimization Techniques /Reinforcement Learning	**PE**	3	3	0	0	3
6		Open Elective -IV Cyber security	**OE**	3	3	0	0	3
7	24GE2M01	Environmental and Sustainable Engineering	**MC**	2	2	0	0	0
Practical Courses								
1	24AM6911	Data Mining and Big data analytics laboratory	**PC**	4	0	0	4	2
2	24PT4902	Soft skills-Reasoning	**EEC**	1	0	0	2	1
3	24CS6912	Internship	**EEC**	2	0	0	4	2
			Total	27	20	0	10	23

SEMESTER VII

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24HS7101	Principles of Quality and Management	**HSSM**	3	3	0	0	3
2	24AM7601	Advanced Machine Learning	**PC**	3	3	0	0	3
3		Professional Elective IV : AI for Cyber security	**PE**	3	3	0	0	3
4		Professional Elective V : AI for Health care	**PE**	3	3	0	0	3
5		Professional Elective VI : Advanced AI (gen, Neuro symbolic AI)	**PE**	3	3	0	0	3
Practical Courses								
1	24AM7611	Advanced Machine Learning Laboratory	**PC**	4	0	0	4	2
2	24AM7612	Mobile Application Development Laboratory	**PC**	4	0	0	4	2
3	24GE7911	Creative and Innovative Project	**EEC**	1	0	0	2	2
			Total	**24**	**15**	**0**	**6**	**20**

SEMESTER VIII

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	24AM8911	Project Work	EEC	20	0	0	18	9
			Total	20	0	0	18	**9**

Total Credits: 164

List of Humanities and Social Sciences Including Management (HSSM) Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24HS1103	Tamil Heritage/ தமிழர் மரபு	HSSM	2	2	0	0	1
2	24HS2101	Technical Communication Skills	HSSM	2	2	0	0	2
3	24HS2103	Technology in Tamil Culture/ தமிழரும் தததொழில் நுட்பமும்	HSSM	2	2	0	0	1
4	24HS4101	Professional Ethics and Human Values	HSSM	2	2	0	0	2
5	24HS7101	Principles of Quality and Management	HSSM	3	3	0	0	3
Theory cum Practical Courses								
6	24HS1101	Professional Communication Skills	HSSM	4	2	0	2	3

List of Basic Science Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24MA1201	Matrices and Multivariable Calculus	BS	4	3	1	0	4
2	24PH1301	Applied Physics	BS	2	2	0	0	2
3	24CY1401	Applied Chemistry	BS	2	2	0	0	2
4	24MA2201	Complex Analysis and Fourier Series	BS	4	3	1	0	4
5	24MA3201	Mathematical Foundation for Data Science	BS	4	3	1	0	4
6	24MA4201	Discrete Mathematics	BS	4	3	1	0	4
Practical Courses								
1	24PC1311	Applied Physics and Chemistry Laboratory	BS	4	0	0	4	2

List of Engineering Science Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24CS1501	Introduction To Programming With C	ES	3	3	0	0	3
2	24AM1601	Artificial Intelligence Essentials	ES	3	3	0	0	3
3	24CS2501	Introduction to Computing using Python	ES	3	3	0	0	3
4	24EE2501	Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3
5	24ME1501	Engineering Graphics	ES	4	2	0	4	4
6	24IT3501	Digital Principles and System Design	ES	4	2	0	2	3
Practical Courses								
1	24CS1511	Programming Practice Laboratory using C	ES	4	0	0	4	2
2	24GE1511	Engineering Practices Laboratory	ES	4	0	0	4	2
3	24CS2511	Python Programming Laboratory	ES	4	0	0	4	2

List of Employability Enhancement Course

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Practical Courses								
1	24GE2901	Design Thinking	EEC	1	1	0	0	1
2	24PT3902	Soft skills-Verbal Ability	EEC	1	0	0	2	1
3	24PT3901	Soft skills-Aptitude - I	EEC	1	0	0	2	1
4	24GE4911	Design Thinking Project	EEC	1	0	0	2	1
5	24HS5101	Communication and Soft skills Laboratory	EEC	1	0	0	2	1
6	24PT4902	Soft skills-Reasoning	EEC	1	0	0	2	1
7	24PT4901	Soft skills-Aptitude II	EEC	1	0	0	2	1
8	24AM6912	Internship	EEC	2	0	0	4	2
Practical Courses								
1	24GE7911	Creative and Innovative Project	EEC	4	0	0	4	2
2	24AM8911	Project Work	EEC	20	0	0	18	9

List of Professional Electives Courses

S.No	Course Code	Course Name	Semester	L	T	P	C	Stream/ Domain
Professional Elective I								
1	24AM5701	Advanced Computer Vision and Information Processing Techniques	5	3	0	0	3	Advanced Machine Learning and Deep Learning
2	24AM5702	Big Data Technologies	5	3	0	0	3	Data Science and Analytics
3	24AM5703	AI for Healthcare	5	3	0	0	3	AI in Industry and Applications
4	24AM5704	Ethical AI and Responsible AI Practices	5	3	0	0	3	Ethics, Policy, and Societal Impact
5	24AM5705	Graphics and Multimedia	5	3	0	0	3	Creative Media
6	24AM5706	Robotics Fundamentals and Design	5	3	0	0	3	Robotics and Intelligent Systems
Professional Elective II								
1	24AM6701	Robotics and Automation	6	3	0	0	3	Advanced Machine Learning and Deep Learning
2	24AM6702	Data Mining and Warehousing	6	3	0	0	3	Data Science and Analytics
3	24AM6703	Autonomous Systems and Robotics	6	3	0	0	3	AI in Industry and Applications
4	24AM6704	AI and Privacy	6	3	0	0	3	Ethics, Policy, and Societal Impact
5	24AM6705	Virtual Reality	6	3	0	0	3	Creative Media
6	24AM6706	Autonomous Systems and Navigation	6	3	0	0	3	Robotics and Intelligent Systems

Professional Elective III								
1	24AM6706	Optimization Techniques and Reinforcement Learning	6	3	0	0	3	Advanced Machine Learning and Deep Learning
2	24AM6707	Statistical Methods for Data Science	6	3	0	0	3	Data Science and Analytics
3	24AM6708	Computer Forensic Analysis and Investigation	6	3	0	0	3	AI in Industry and Applications
4	24AM6709	Regulatory Frameworks for AI and Emerging Technologies	6	3	0	0	3	Ethics, Policy, and Societal Impact
5	24AM6710	Visual Effects	6	3	0	0	3	Creative Media
6	24AM6711	Human-Robot Interaction	6	3	0	0	3	Robotics and Intelligent Systems
Professional Elective IV								
1	24AM7701	Generative Adversarial Networks (GANs)	7	3	0	0	3	Advanced Machine Learning and Deep Learning
2	24AM7702	Predictive Analytics	7	3	0	0	3	Data Science and Analytics
3	24AM7703	Prompt Engineering	7	3	0	0	3	AI in Industry and Applications
4	24AM7704	Ethics and Artificial Intelligence	7	3	0	0	3	Ethics, Policy, and Societal Impact
5	24AM7705	Video Creation and Editing	7	3	0	0	3	Creative Media
6	24AM7706	Intelligent Control Systems	7	3	0	0	3	Robotics and Intelligent Systems
Professional Elective V								
1	24AM7706	Transfer Learning and Domain Adaptation	7	3	0	0	3	Advanced Machine Learning and Deep Learning
2	24AM7707	Business Intelligence and Data Warehousing	7	3	0	0	3	Data Science and Analytics
3	24AM7708	Ethical Hacking and Cyber Forensics	7	3	0	0	3	AI in Industry and Applications
4	24AM7709	Privacy, Security, and AI	7	3	0	0	3	Ethics, Policy, and Societal Impact
5	24 AM7710	Game Development	7	3	0	0	3	Creative Media
6	24AM7711	Swarm Robotics and Multi-Agent Systems	7	3	0	0	3	Robotics and Intelligent Systems

Professional Elective VI								
1	24AM7711	Prompt Engineering	7	3	0	0	3	Advanced Machine Learning and Deep Learning
2	24AM 7712	Business Intelligence	7	3	0	0	3	Data Science and Analytics
3	24AM7713	Intrusion Detection and Prevention System	7	3	0	0	3	AI in Industry and Applications
4	24AM7714	Responsible AI: Bias, Fairness, and Transparency	7	3	0	0	3	Ethics, Policy, and Societal Impact
5	24AM7715	Multimedia Data Compression and Storage	7	3	0	0	3	Creative Media
6	24AM7716	Machine Learning for Robotics	7	3	0	0	3	Robotics and Intelligent Systems

List of Open Electives Courses

Offered to Departments - Civil, EEE & Mech

S.No	Course Code	Course Name	Sem	L	T	P	C	Offered from
Open Elective I								
1	24AM3801	Fundamentals of Data Structures and Algorithms	3	3	0	0	3	AI ML
2	24AM3802	Core Concepts in Operating Systems	3	3	0	0	3	AI ML
3	24 AM3804	Object Oriented Programming in C++	3	3	0	0	3	AI ML
4	24AM3805	Best Practices in Software Engineering	3	3	0	0	3	AI ML
Open Elective II								
1	24AM4801	Web Design and Management	4	3	0	0	3	AI ML
2	24AM4802	Foundations of Mobile Game Design	4	3	0	0	3	AI ML
3	24AM4803	Fundamentals of Multimedia Principles	4	3	0	0	3	AI ML
4	24AM4805	SQL Programming	4	3	0	0	3	AI ML
Open Elective III								
1	24AM5801	Essentials of Cloud Computing	5	3	0	0	3	AI ML
2	24AM5802	Foundations of Virtual Reality and Augmented Reality	5	3	0	0	3	AI ML

3	24AM5803	Fundamentals of Android Application Development	5	3	0	0	3	AI ML
4	24AM5804	Artificial Intelligence Essentials	5	3	0	0	3	AI ML
Open Elective IV								
1	24AM6801	Blockchain Technologies	6	3	0	0	3	AI ML
2	24AM6802	Machine Learning Techniques	6	3	0	0	3	AI ML
3	24AM6803	Animation Designing	6	3	0	0	3	AI ML
4	24AM6804	Ethical hacking and its practices	6	3	0	0	3	AI ML

SEMESTER I

S. No	Course Code	Course Name	Category	Contact Periods	L	T	p	C
Theory Courses								
1	24MA1201	Matrices and Multivariable Calculus	**BS**	4	3	1	0	4
2	24PH1301	Applied Physics	**BS**	2	2	0	0	2
3	24CY1401	Applied Chemistry	**BS**	2	2	0	0	2
4	24CS1501	Introduction To Programming With C	**ES**	3	3	0	0	3
5	24AM1601	Artificial Intelligence Essentials	**ES**	2	2	0	0	2
6	24HS1103	Tamil Heritage/ u:SlbP6" L.OIJ	**HSSM**	2	2	0	0	1
Theory cum Practical Courses								
1	24HS1101	Professional Communication Skills	**HSSM**	4	2	0	2	3
Practical Courses								
1	24PC1311	Applied Physics and Chemistry Laboratory	**BS**	4	0	0	4	2
2	24CS1511	Programming Practice Laboratory using C	**ES**	4	0	0	4	2
3	24GE1511	Engineering Practices Laboratory	**ES**	4	0	0	4	2
			Total	31	16	1	14	**23**

24MA1201	MATRICES AND MULTIVARIABLE CALCULUS	L	T	p	C
		3	1	0	4

Preamble:

The course consists of topics in Matrices, Differential calculus, Integral calculus, Differential Equations and Vector calculus with applications to various engineering problems. This course will cover the following main topics: Cayley Hamilton Theorem, Linear differential equations of second order with constant coefficients, Methods of Variation parameter, Taylor's expansion of two variables, Maxima and Minima for two variables, Area and Volume in a multiple integrals, Green's theorem and Gauss divergence theorem.

Prerequisites for the course:

Students should have basic knowledge about matrices, differentiation and integration

Objectives

1. To apply advanced matrix knowledge to Engineering problems
2. To familiarize with the applications of differential equations.
3. To familiarize with the functions of several variables
4. To have Knowledge in Multiple integrals
5. To improve their ability in Vector calculus.

UNIT I	MATRICES	9+3

Matrices-Characteristic equation-Eigenvalues and Eigenvectors of a symmetric and non- Symmetric matrix-Properties of Eigenvalues and Eigenvector- Cayley-Hamilton theorem and its applications

UNIT II	ORDINARY DIFFERENTIAL EQUATIONS	9+3

Differential Equations - Complementary Function - Particular Integral - Linear equations of second order with constant coefficients of types exponential, trigonometry, polynomial and its combination forms-Methods of Variation of parameter -Engineering Applications.

UNIT III	FUNCTIONS OF SEVERAL VARIABLES	9+3

Function of two variables - Partial derivatives-Taylor's expansion for two variables - Maxima and Minima for two variables - Jacobian of two and three variables -Euler's theorem For homogeneous function.

UNIT IV	MULTIPLE INTEGRALS	9+3

Definite Integrals - Properties of definite integrals - Double integration in Cartesian coordinates Area as a double integral in Cartesian coordinates - Triple integration in Cartesian coordinates Volume as a Triple Integral

UNITV	VECTOR CALCULUS	9+3

Vector dot product and Vector cross product - Gradient, divergence, curl - Solenoidal and irrational fields - Unit normal vector -Angle between two surfaces - Directional derivatives - Green's theorem, Gauss divergence theorem (without proof)

Total Periods	45+15=60 Periods

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
1. Descriptive Questions	l.Assignment 2. Online Quizzes	1. Descriptive Questions

Outcomes

Upon completion of the course, the students will be able to:

COl:Find the Eigenvalues, Eigenvectors, inverse and the positive powers of a square matrix. (Apply)

CO2: Identify the suitable method to solve second and higher order differential equations (Apply)

CO3:Find the maxima and minima for a given function with several variables, through by finding stationary points. (Apply)

CO4: Compute area and volume using double and triple integration. (Apply)

05: Apply the concepts of Differentiation and Integration to Vectors. (Apply)

Text Books

1. B. S. Grewal, "Higher Engineering Mathematics", 43rdedition, 2017.
2. James Stewart, Calculus - Early Transcendals, sthEdition, 2016.

Reference Books

1. N. P. Bali, Dr. Manish Goyal, A Text book of Engineering Mathematics, University Science Press, 9th Edition, 2016.
2. K. Ganesan, Sundarammal Kesavan, K. S. Ganapathy Subramanian &V. Srinivasan, "Calculus and Solid Geometry", Revised Edition,2017

Web Resources

1. Eigenvalues and eigen vectors-https://youtu.be/h5urBuE4Xh
2. Cayley Hamilton theorem-https://youtu.be/WROFJ15hk00
3. E-https://youtu.be/Im242eBqaxw
4. Functions of several variables-https:/ /youtu.be/PA82F91e1vs
5. Integration-https://youtu.be/bVui07yHjzE,
6. Multiple integralshttps://youtu.be/3BbrC9JcjOU
7. Volume as Triple integral https://youtu.be/w_KiHgultbM
8. Vector calculus-https://youtu.be/v3ZC4MolfS0i
9. Gauss divergence theoremhttps://youtu.be/U9LDcmKUGS0

COs PO Mapping and CO Vs PSO Mapping:

CO	P01	P02	P03	P04	POS	P06	P07	POB	P09	P010	P011	P012	PS01	PS02	PS03
1	3	3											1		
2	3	3		2											
3	3	3		1									1	1	
4	3	2		1									1	1	
5	3	2		1									1		

COURSE OUTCOME 1(CO1): (Apply)

1) Three Football players Messi, Ronalda and Neymar are throwing a ball to each other. Messi, throws the ball to himself by two times, to Neymar one time and never throws to Ronalda. Ronalda throws the ball to himself by two times and never throws the ball to Messi and Neymar. Neymar throws the ball to Messi one time and to himself by two times and he never the balls to Ronalda.

i) Write down the matrix of the above problem

ii) In the characteristic equation $\lambda^3 - S_1\lambda^2 + S_2\lambda - S_3 = 0$. what is S_2?

iii) what is S_3?

iv) Write down the characteristic equation

v) Find its eigenvalue

vi) Find the eigenvectors.

2) A salesperson has the following record of sales for the month of June, July and August 2023 for three products A, B, and C.

Months	Sales in Units		
	A	B	C
June	2	2	1
July	1	3	1
August	1	2	2

i) Write down the matrix of the above problem

ii) In the characteristic equation $\lambda^3 - S_1\lambda^2 + S_2\lambda - S_3 = 0$ what is S_1?

iii) what is S_2

iv) what is S_3?

v) Write down the characteristic equation

vi) Verify Cayley Hamilton theorem for the above situation

vii) Find the inverse of the above matrix.

COURSE OUTCOME 2(C02): (Apply)

1) Consider the differential equation y'' - 3y' + 4y = 4 and answer the following
2) The order and degree of the above differential equation is------ & --------
3) The auxiliary equation of the above ODE is _____
4) The roots of the auxiliary equations are _____
5) The complementary function of the above ODE is _____
6) The particular integral is
7) Solve by method of variation of parameters $(D^2 + 4)y = tan2x$.

COURSE OUTCOME 3(C03): (Apply)

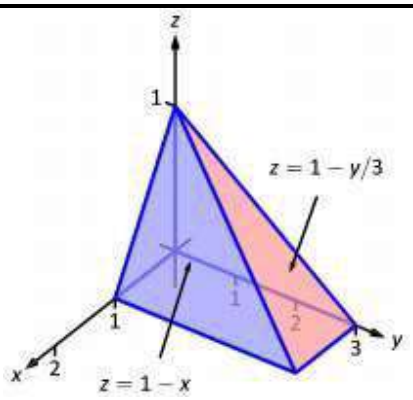
1) Expand the given power signal $f(x, y) = e^x \log(1 + y)$ as a Taylor's series in the powers of x and yup to the third degree terms.

2) If the radiation of the particle is $u = sin^{-1}(\frac{x^3 - y^3}{x+y})$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2\tan u.$
Using Euler's theorem.

COURSE OUTCOME 4(C04): (Apply)

1) A domainD is described by its bounding surfaces, along with a graph. Set up the triple integrals that give the volume of Din all 6 orders of integration, and find the volume of *D* by evaluating the indicated triple integral is bounded by the planes y= 0,y= 2,x=l,z=0 and z=(2-x)/2.

2) A domain Dis described by its bounding surfaces, along with a graph. Set up the triple integrals that give the volume of *D* in all 6 orders of integration, and find the volume of *D* by evaluating the indicated triple integral. Dis bounded by the coordinate planes and by z=l-y/3 and z=l-x Evaluate the triple integral with order *dx dy dz.*



COURSE OUTCOME S(COS): (Apply)

1) VerifyGreen's theorem for $\int_C f(3x^2-8y^2)dx+(4y-6xy)dy$ where C is the boundary of the region bounded by the lines $x = 0, y = 0, x + y = 1.$

2) Verify Gauss divergence theorem for $\vec{F} = (x^2 - yz)\vec{\imath} + (y^2 - xz)\vec{\jmath} + (z^2 - xy)\vec{k}$ taken over the rectangle parallelepiped bounded by the planes $x = 0, x = a, y = 0, y = b$ and z = 0, $z = c$

NPTEL/SWAYAM Course:

S.No.	NPTEL Course Name	Instructor	Host Institute
1.	Engineering Mathematics - I	Prof. Jitendra Kumar	IIT Kharagpur

24PH1301	APPLIED PHYSICS (Common to All Branches)	L	T	P	C
		2	0	0	2

Preamble

The aim of this course is to impart fundamental knowledge in materials and related basic physical concepts which are essential in understanding and explaining engineering devices.It encompasses the application of the basic principles of physics to the development of various engineering fields.

Prerequisites for the course

Nil

Objectives

- To develop a thorough understanding of the fundamental principles and practical applications of semiconductor devices.
- To foster an idea on the significance of nanostructures, quantum confinement, and their implications for nano device applications and quantum computing.
- To introduce the fundamentals of heat transfer through various materials, the thermal performance of buildings, and diverse thermal applications.
- To provide comprehensive knowledge on the principles and practices of building ventilation and air conditioning.
- To impart knowledge on the study of various sensors.

UNIT I	**OPTOELECTRONIC DEVICES**	**6**

Introduction to semiconductors - direct and indirect band gap - p-n junction - Transistor - p-n-p and n-p-n transistors - Sources: Solar cell - Light Emitting Diode (LED) - Organic Light Emitting Diode (OLEO) - Laser diodes.

UNIT II	**NANO DEVICES AND QUANTUM COMPUTING**	**6**

Introduction - quantum confinement - quantum structures: quantum wells, wires and dots - band gap of nanomaterials - Tunneling - Single electron phenomena and single electron transistor - quantum cellular automata - Quantum system for information processing - quantum states - classical bits - quantum bits or qubits -CNOT gate - advantage and applications of quantum computing.

UNIT III	**THERMAL APPLICATIONS**	**6**

Introduction - Principles of heat transfer - thermal expansion of solids and liquids - expansion joints - bimetallic strips - thermal conductivity - Lee's disc method: theory and experiment - heat transfer through fenestrations, thermal insulation and its benefits - heat gain and heat loss estimation - factors affecting the thermal performance of buildings - thermal measurements, thermal comfort.

UNIT IV	**VENTILATION AND REFRIGERATION**	**6**

Introduction - Ventilation - Requirements, principles of natural ventilation - Ventilation Measurements - Air conditioner - window air conditioner - chilled water plant - fan coil systems - Air conditioning systems for different types of buildings - Protection against fire to be caused by AC. Systems

UNITV	**SENSORS**	**6**

Introduction to sensor - Hall effect sensor - SQUID sensor - Gas sensor - Medical sensor - Ultrasonic sensor - Fiber Optic sensor- Temperature and displacement sensors - liquid level sensing - Fluid flow sensing - microbend Sensors.

Total Periods	30

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	**Formative Assessment Test (20 Marks)**	**End Semester Exams (60 Marks)**

Descriptive	Assignment Online Quizzes Problem-Solving Activities	Descriptive

Outcomes

Upon completion of the course, the students will be able to:

CO 1	Apply the knowledge of semiconductor devices to design and optimize practical electronic systems. **Apply**
CO 2	Understand the basics of quantum structures and their applications and basics of quantum computing. **Understand**
CO 3	Acquire the knowledge about heat transfer through different materials, thermal performance of building and thermal insulation. **Understand**
CO 4	Acquire the understanding of building ventilation and air conditioning systems. **Understand**
CO 5	Apply the knowledge of sensor technologies to design and implement sensor systems for real-world applications. **Apply**

Text Books

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2011.
2. Thomas L. Floyd, Electronic Devices, Pearson India Education Services Pvt. Ltd, 2021.
3. Parag K. Lala, Quantum Computing: *A* Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.
4. 8.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 3rd Edition 2017.
5. Dr. G. Senthil Kumar and Dr. S. Murugavel, Physics for Civil Engineering, VRB Publishers Pvt. Ltd, 2024.
6. Patranabis D, Sensors and Transducers, 2nd Edition, PHI, New Delhi, 2017.

Reference Books

1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
2. Dr. G. Senthil Kumar and Dr. S. Murugavel, Physics for Information Science, VRB Publishers Pvt. Ltd, 2024.
3. Dr. P. Mani, Physics for Information Science, Dhanam Publications, Fourth Edition, 2022.
4. Dr. R. Sudharsanan and Dr. S. Devashankar, Physics for Civil Engineering, Sri Krishna Hitech Publishing Company Pvt. Ltd, 2024.

Web Resources

1. UNIT 1- https://www.elprocus.com/difference-between-npn-and-pnp-transistor/

2.UNIT2- https://docs.google.com/presentation/d/1u6TSbTaDN972JVuWgzJIIKW5HwouUwzW /edit?usp=drive_link&ouid=110360556588092263393&r pof=true&sd=true

3. UNIT 3- https://vlab.amrita.edu/?sub=1&brch=194&sim=353&cnt=1

4. UNIT 4-https://happho.com/natural-ventilation-principles-to-be-used-for-building-construction/

5. UNIT 5- https://www.sciencedirect.com/topics/engineering/displacement-sensor

COs PO Mapping and CO Vs PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	P90	PO 10	PO 11	PO 12	PS 01	PS 02	PSO 3
1	3	1						2				1			
2	3	1						2				1			
3	3	1										1			
4	3	1													
5	3	1													

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Apply the knowledge of semiconductor devices to design and optimize practical electronic systems. Apply

1. How do the fundamental principles of light emission in LEDs and light absorption in solar cells illustrate the interplay between energy conversion processes in optoelectronic devices.
2. How does the construction and operation of solar cells demonstrate the principles of semiconductor physics and energy conversion, and what advancements in materials science could enhance their efficiency?

COURSE OUTCOME 2: Understand the basics of quantum structures and their applications and basics of quantum computing. **Understand**

1. In what ways do the dimensional constraints in quantum wells, quantum wires, and quantum dots influence their electronic and optical properties, and what potential applications arise from these unique characteristics in advanced technological fields?
2. How does the operation of a single-electron transistor (SET) manipulate the behavior of individual electrons, and what implications does this have for the development of quantum computing and nanoscale electronics?
3. How does the symbolic representation, physical construction, and resultant truth table of a CNOT gate illuminate the role of controlled operations in quantum computing and its potential for transformative computational paradigms?

COURSE OUTCOME 3: Acquire the knowledge about heat transfer through different materials, thermal performance of building and thermal insulation. **Understand**

1. Imagine a quantity of heat flowing through a metal slab whose faces are kept at two different temperatures. Determine the thermal conductivity of a bad conductor.
2. In what manner does heat transfer occur through fenestration, and how does understanding this process contribute to the optimization of building energy efficiency and thermal comfort?

COURSE OUTCOME 4: Acquire the understanding of building ventilation and air conditioning systems. **Understand**

1. List out the important points to be considered while designing natural ventilation for buildings.
2. Suppose you are hired as a consultant for a newly constructed hotel that aims to offer optimal climate control in each room. How would you explain the construction and functionality of a fan coil unit to the hotel management team?
3. Imagine you are tasked with designing a comprehensive fire safety plan for a commercial building that relies heavily on air conditioning systems. How would you outline measures to prevent fires caused by these AC systems?

COURSE OUTCOME 5: Apply the knowledge of sensor technologies to design and implement sensor systems for real-world applications. **Apply**

1. Imagine you are creating a high-tech medical device that monitors a patient's condition. How would you describe the functions and importance of temperature sensors and displacement sensors in ensuring the device operates effectively?

2. Suppose you are leading a team tasked with designing a cutting-edge magnetometer for detecting anomalies in underground pipelines. How would you lead a discussion about the functionalities and applications of SQUID sensors in this project

24CY1401	APPLIED CHEMISTRY	L	T	p	C
		2	0	0	2

Preamble

To enable the students to acquire knowledge in the concepts of chemistry for engineering applications and to familiarize the students with different application oriented topics like sensors, batteries, electrodes, materials for memory and display systems, corrosion prevention methods, and processes in electronics manufacture etc., which enable them to develop abilities and skills that are relevant to the study and practice of engineering chemistry.

Prerequisites for the course

Basic theoretical concepts of Chemistry in higher secondary level.

Objectives

1. To inculcate sound understanding of different types of sensors and batteries.
2. To develop an understanding of the basic concepts of electronic memory and display systems.
3. To make the students familiar with the principles of corrosion and electrodes.
4. To explore semiconductor manufacturing, PCB assembly, consumer electronics, automotive electronics, telecommunications, and microchip fabrication in the electronics industry.
5. To understand the electronic waste (e-waste) and manage the e-waste in an environmentally sustainable manner.

UNIT I	Energy Systems and Sensors	6

Energy Systems: Introduction, classification of batteries. Components, construction, working and applications of modern batteries; Zn-air and solid state battery (Li ion - polymer battery).

Sensors: Introduction, working principle and applications of Electrochemical sensors and Optical sensors. Classification of electrochemical sensors.

UNIT II	Materials for Memory and Display Systems	6

Memory Devices: Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, types of organic memory devices; Organic molecules (p-type semiconductor - Pentacene; n-type semiconductor - Perfluoropentacene used as memory materials).

Display Systems: Photoactive and electroactive materials. Organic materials used in Optoelectronic devices-Light absorbing materials - Polythiophenes (P3HT), Light emitting materials - Poly[9-

vinylcarbazole] (PVK)]- Materials for LCD - Liquid crystals (LC's) - Introduction, classification, properties and applications in Liquid Crystal Displays (LCD's).

UNIT III	Corrosion and Electrode System	6

Corrosion: Introduction, Industrial, environmental and economic impacts of Corrosion (global concern), types of corrosion - dry /wet Corrosion, electrochemical theory of corrosion, principle and preventive methods of Galvanic corrosion and Differential aeration corrosion - (Water line), Corrosion control methods - galvanization and sacrificial anode method.

Electrode System: Introduction, types of electrodes. Ion selective electrode - construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode - construction, working and applications of calomel electrode.

UNIT IV	Processes in Electronics Manufacture	6

Microchip fabrication - *overview*, photoresists - chemistry, types. Fabrication facilities - clean rooms - maintenance, ultrapure water- specification, production processes - ion exchange, reverse osmosis. PCB fabrication - electroless and electroplating of copper - principle, bath chemistries and process parameters.

UNITV	E-Waste Management	6

E-Waste: Introduction, sources of e-waste, Composition and Characteristics, Need for e-waste management concerning global perspective. Toxic materials used **in** manufacturing electronic and electrical products; health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches ofrecycling (separation-thermal treatments), E-waste management rule.

Total Periods	**30**

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
WRITTEN TEST	ASSIGNMENT & ONLINE QUIZZES	WRITTEN TEST

Outcomes

Upon completion of the course, the students will be able to:

1	Identify appropriate sensors based on the requirements of different energy systems, considering factors such as accuracy, precision, response time, and environmental conditions.(Apply)
2	Apply the skills to design and optimize display systems by selecting suitable materials for applications such as liquid crystal displays (LCDs). (Apply)
3	Apply the knowledge of electrode systems used in various applications such as

	electroplating, batteries, corrosion monitoring, and electrochemical sensors.(Apply)
4	Apply the knowledge in various sectors of the electronics industry. Identify suitable materials for fabrication of microchip. (Apply)
5	Recognise environmental challenges posed by electronic waste (e-waste). (Knowledge)

Text Books

1. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2018.
2. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2018.

Reference Books

1. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
2. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley& Sons, 2010
3. Vairam Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
4. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: TheNational Academies Press. doi: 10.17226/4782.
5. R.Gopalan, D.venkappayya, S.Nagarajan Engineering Chemistry, Vikas Publishing house private limited.
6. "Handbook of Electronic waste Management" International best practices and case studies.
7. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.

Web Resources

1. https://www.scribd.com/document/673718581/2710-1681213457085(Materialsfor memory and display systems)
2. https:/ /petronthermoplast.com/conductivity-sensor-and-its-working-principle/#
3. https://www.st.com/resource/en/application_note/cd00003986-introduction-to-semiconductor-technology-stmicroelectronicspdf
4. .https://en.wikipedia.org/wiki/Photoresist#:~:text=A%20photoresist%20(also%20known%20simply,crucial%2 0in%20the%20electronics%20industry.
5. https:/ /www.therma.com/https-www-therma-com-cleanroom-maintenance/
6. https://residuoselectronicos.net/archivos/documentos/21Brasil_Widmer%20et%20al.%20Global%20Perspectives.pdf
7. https://nair.indianrailways.gov.in/uploads/files/1410168855632-PNM%20E-wast%20mgt_Abhivyakti.pdf(Toxic materials in e-waste)
8. https:/ /blog.mywastesolution.com/ e-waste-gold-recovery-the-right-way/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	PO2	PO3	PO4	POS	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3									2			
2	3	3	3					2				2			
3	3	3	3									2			
4	3	3	3									2			
5	3	2				3	3	2				2			

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Identify appropriate sensors based on the requirements of different energy systems, considering factors such as accuracy, precision, response time, and environmental conditions (Understand)

1. You are tasked with developing a portable device designed to monitor air quality in urban areas, with a specific focus on detecting pollutants such as carbon monoxide (CO) and nitrogen dioxide (N02). In this context, provide a comprehensive explanation of the working principles of electrochemical sensors. Additionally, discuss the advantages of these sensors offer for air quality monitoring applications, particularly in portable devices intended for urban environments. Include considerations of their sensitivity, selectivity, power consumption, size, and ability to provide real-time monitoring.

COURSE OUTCOME 2: Apply the skills to design and optimize display systems by selecting suitable materials for applications such as liquid crystal displays (LCDs). (Apply)

1. Choosing the right materials for applications like liquid crystal displays (LCDs) presents a challenge for engineers in terms of design and optimization. Discuss the criteria and considerations involved in material selection, including factors such as optical properties, electrical characteristics, mechanical strength, and environmental stability. Explain how these material properties influence the performance, durability, and efficiency of LCD systems. Provide examples of specific materials commonly used in LCDs and their roles within the display technology.

COURSE OUTCOME 3: Apply the knowledge of electrode systems used in various applications such as electroplating, batteries, corrosion monitoring, and electrochemical sensors.(Apply)

1. As an environmental scientist, you need to prepare a report addressing the electrochemical corrosion mechanism on metallic surfaces and its potential for releasing toxic products during

degradation. Your report should also provide strategies to reduce environmental risks. In your report, please address the following questions:

A). How does the electrochemical corrosion mechanism influencing metallic surfaces contribute to the undesired release of toxic products during degradation? Provide an explanation with relevant examples.

B). What strategies can be devised to mitigate or minimize the environmental risks associated with electrochemical corrosion on metallic structures in the coastal area? Offer detailed solutions or recommendations.

COURSE OUTCOME 4: Apply the knowledge in various sectors of the electronics industry. Identify suitable materials for fabrication of microchip. (Apply)

1. Imagine you are an engineer tasked with optimizing the electroplating process for copper in a manufacturing facility that produces electronic components. Discuss the comprehensive steps and considerations involved in achieving a high-quality and uniform copper coating. Address the composition and control parameters of the electroplating solution, the configuration of electrodes and management of current density, and the importance of surface preparation and treatment. Additionally, explain the quality control methods and testing techniques necessary to ensure the electroplated copper meets industry standards. Use specific examples from the manufacturing facility to illustrate how each aspect contributes to the overall effectiveness and reliability of the copper electroplating process.

COURSE OUTCOME 5: Recognize environmental challenges posed by electronic waste (e-waste). (Knowledge)

1. Examine ecologically conscious and sustainable approaches to addressing the problems caused by electronic trash, or "e-waste." Analyze the environmental and health impacts of e-waste, and examine the roles of various stakeholders, including manufacturers, consumers, and policymakers, in mitigating these challenges. Provide specific examples of effective e-waste management practices and policies, and propose innovative solutions for reducing, recycling, and responsibly disposing of e-waste

24CS1501	INTRODUCTION TO PROGRAMMING WITH C	L	T	P	C
		3	0	0	3

Preamble

This course aims to provide the students with a foundation of structured and procedural programming with computer programming and C programming concepts. The focus is to develop the basic programming skills in students, and to improve their proficiency in applying the basic knowledge of programming to solve problems. This will enable the students to develop modular applications related to the field of engineering.

Pre-requisites for the course

- NIL

Objectives

1. To learn the introduction to computing and basics of structured programming with C.
2. To learn Control structures and functions and their implementation in C.
3. To learn arrays and strings concepts & functions in C and use pointers for storing data in the main memory efficiently.
4. To learn structures and union concepts of C Programming
5. To learn file processing functions and further develop applications in C.

UNIT I	INTRODUCTION TO COMPUTING AND C LANGUAGE	6+3

Introduction to Computing - Memory, Registers - Variables, Values, Instructions, Programs - Computer Languages (Machine/ Assembly/High level language) - Compilers, Assemblers, Interpreters, Loaders Programming paradigms -Data representation and conversions -Pseudocode, Algorithm, Flowchart.
C: Evolution of C, Characteristics and applications of C - Structure of a 'C' program -Compilation and Execution of C Program-Data Types- Variables- Constants, Type Conversion- Type casting, C Tokens- Keywords- Identifiers-Operators -Precedence and Associativity **-1/0** statements -Simple programs.

SUGGESTED ACTIVITIES

- Demonstrate Algorithms and Flowcharts using tools.
- Demonstrate the use of data types, operators in C.
- Demonstrate simple programs with 1/0 statements.

SUGGESTED EVALUATION METHODS

- Assignment on algorithm and flowchart
- Quiz on problem solving and basics of C programming
- Questioning with Code snippets

UNIT II	CONTROL STRUCTURES AND FUNCTIONS	7+3

Control structures: Branching and Iterative statements- Decision making - Looping statements - Nested Loops-break and continue statements -Pattern printing.
Functions: Declaration, Definition, function Call, arguments and Return statement- Parameter passing methods- Recursion -Storage Classes -Scope and life time of Variables.

SUGGESTED ACTIVITIES

- Comparison study on the types of decision making and looping statements
- Demonstration on control structures and functions

- Demos on Recursion, Pattern printing.

SUGGESTED EVALUATION METHODS

- Quiz on data types, operators, statements, loops and arrays, Questioning with Code snippets
- Code Walk throughs -Tutorials,
- Coding Assessment -Online platforms -Hackerrank, Leetcode, Code force.

UNIT III	ARRAYS, STRINGS AND POINTERS	7+3

Arrays: Declaration, Initialization - Operations- One dimensional Arrays- Traversal, Searching, Sorting, Merging of arrays - Two Dimensional Arrays- Matrix operations - Multidimensional Arrays- Strings: String operations -Array of Strings.
Pointers: Declaration- Definition- Pointer Arithmetic- Null, Void, Wild/ Dangling, constant pointers, - Pointers and Arrays- Pointers and Functions- Pointers and Strings- Pointers to Pointers, Dynamic Memory Allocation.

SUGGESTED ACTIVITIES

- Demonstration of Application of Arrays -Image processing.
- Discussion on array of pointers, function pointers and array of function pointers.
- Demonstration on dynamic memory allocation.
- Solve problems on pointers to arrays, pointers to functions and pointers to pointers.

SUGGESTED EVALUATION METHODS

- Quiz on basics of Arrays, strings and pointers.
- Programming Assignment, Code Walkthroughs.
- Coding Assessment -Online platforms -Hackerrank, Leetcode, Code force.

UNIT IV	STRUCTURES AND UNIONS	5+3

Structure: Declaration and Initialization- Nested Structures- Array of Structures- Structures and functions- Structure pointers- Self-referential structures. Unions: Declaration and Initialization- Structures and unions.

SUGGESTED ACTIVITIES

- Discussion and comparison of Structures and Unions.
- Self-referential structure -Linked list application.
- Write programs using nested structures and union inside structures.

SUGGESTED EVALUATION METHODS

- Demonstration of programs using pointers to structures and self-referential structures
- Simple application development

UNIT V	FILE PROCESSING AND PRE-PROCESSOR DIRECTIVES	5+3

Introduction to Files -Using Files in C- File modes - File operations - Error Handling during file operations- Command line arguments- Pre-processor Directives - Macros - Unconditional directives- Conditional Directives- Error handling in C, Debugging and Testing.

SUGGESTED ACTIVITIES

- Discussion on types of pre-processor directives.
- Demonstration of programs using file operations, pre-processor directives.

- Simple application development.

SUGGESTED EVALUATION METHODS

- Assignment on modes of operations using files in C.
- Simple Applications-File operations.

Total Periods I 45

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
1. DESCRIPTIVE QUESTIONS 2. PROGRAMING AND PROBLEM SOLVING QUESTIONS 3. CODE WALKTHROUGHS	l.ASSIGNMENT 2.ONLINE QUIZZES 3. PROBLEM-SOLVING ACTIVITIES	l.DESCRIPTIVE QUESTIONS 2.PROGRAMING AND PROBLEM SOLVING & LOGICAL THNKING QUESTIONS

Course Outcomes

Upon completion of the course, the students will be able to:

C01 Apply algorithmic thinking to understand, define and solve problems. (Apply)
CO2 Apply code reusability using functions, control structures and solve problems. (Analyze)
C03 Use strings, arrays and pointers in C to solve complex problems. (Apply)
C04 choose appropriate construct based on the problem requirements and provide solutions on organizing data. (Apply)
COS Develop application with file operations to develop real time solutions. (Analyze)

Text Books

1. Beecher K. Computational Thinking: *A* beginner's guide to Problem-solving and Programming. BCS Learning & Development Limited, 2017.
2. Stephen G Kochan, Programming in C, Third Edition, 2004.
3. Brian W. Kernighan, The C Programming Language (Ansi C Version), PHI; 2 edition (1990).
4. Brian W. Kernighan, Dennis M. Ritchie, Programming Languages C with Practicals, Margham Publications; 1 edition (2012)

Reference Books

1. Byron Gottfried "Programming With C" Fourth Edition, McGrawHill, 2018.
2. Yashvant P. Kanetkar. "Let Us C", BPB Publications, 2016.
3. R. G. Dromey, "How to Solve It By Computer", Pearson, 1982

Web Resources

1. https://www.programiz.com/c-programming
2. https://nptel.ac.in/ courses/106105171/
3. https:/ /www.javatpoint.com/c-programming-language-tutorial
4. https:/ /www.tutorialspoint.com/ cprogramming/index.htm
5. https://www.w3schools.com/c/
6. https://www.cprogramming.com

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	POS	P06	P07	P08	P09	P010	P011	P012	PS01	PS02	PS03
1	3	3	3			2							1		
2	3	3	3			2							1		
3	3	3	3			2							2		
4	3	3	3			2							2		
5	3	3	3			2							3		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT1	CATZ	FAT1	FATZ	ENDSEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1): (Apply)

Write algorithm and draw flowchart

1. To count the even numbers between 1 and 200 and print the sum
2. To calculate the simple interest and compound interest
3. To calculate sum of the digits of a number and check if "sum" is an Armstrong number

Course Outcome 2 (CO2): (Apply)

1. Write a program to print the grade of a student based on his marks using switch case.
2. Write a program to print the following pattern

```
1
22
333
4444
55555
```

3. Write a program to input the elements of a two dimensional array. Then from this array make two arrays: one that stores all the odd elements of the array and other that stores all the even elements of the array

Course Outcome 3 (C03): (Apply)

1. Write a program using function to calculate 'x' to the power of 'y' where 'y' can be positive or negative.
2. Write a program to read a paragraph. Then count the number of words, number of lines, number of vowels and number of sentences in it
3. Find the output of the following:

```
        main(){
char *str="ABCDEFGH";
(*str++);       //what will happen if str++; is given here??
printf("%s",str);    }
```

Course Outcome 4 (C04): (Apply)

1. What will be the output of the C program?

```
#include<stdio.h>
int main() {
enum numbers
{
    nl  = 1.5, n2 = 0, n3, n4, n5, n6
};
    printf("%d %d\n", nl, n2);
}
```

2. How many bytes in memory taken by the following C structure?

```
#include <stdio.h>
struct test {
  int k;
  char c;
};
```

Course Outcome 5 (COS): (Apply)

1. Write a program to create a file and store 20 names in it. Write a program to read the names in the file in the reverse order without reopening the file
2. Write a program that reads the file name and text of 20 words as command line arguments. Write the text into a file whose name is given as the file name

24AM1601	Artificial Intelligence Essentials	L	T	P	C
		2	0	0	2

Preamble

The course "AI Essentials" is designed to provide a comprehensive introduction to the fundamental concepts, techniques, and applications of AI. The subject aims to equip students with the foundational knowledge necessary to understand and leverage AI technologies effectively.

Objectives

- Understand Fundamental Concepts of AI
- Learn AI Infrastructure and Technologies
- Master Data Science Fundamentals
- Explore Core AI Concepts and Techniques
- Examine AI Applications and Future Trends

UNIT I	Introduction to AI and Logical Fundamentals	6

AI – Definition – Key concepts – History and Evolution of AI – Applications of AI – Types of AI – Impact of AI – Human Intelligence – Machine Intelligence- Logical operators – Propositional logic – Predicate Logic – Quantifies - Boolean Algebra – Set theory - Basic Algorithms using logic – writing simple programs

UNIT II	AI Infrastructure	6

AI Computing Hardware – GPU, TPU, ASIC, FPGA – Networking – Cloud concepts - Neuromorphic computing – Edge AI – Quantum Computing - AI Computing Software - AI software stack - AI development lifecycle – Frameworks – Deployment platforms – Version control and collaboration - GiT

UNIT III	Foundations of Data Science	6

Data – Definition – Types of Data – Data Collection – Methods of Data Collection – Ethics considerations in Data Collection - Data Storage and Management Data Base – Big Data – Cloud Storage - Data transformations – Data Cleaning – Data Analysis – Data analysis Tools

UNIT IV	AI Concepts	6

Machine Intelligence – Machine Learning concepts – Concept of Training -Types of machine learning algorithms – Models - Google Teachable Machine – Neural Networks – Biology behind Neural networks – Deep Learning - Concepts - Relationship between Data Science, Artificial Intelligence, Machine Learning, Deep Learning.

UNIT V	AI Applications and Trends	6

AI in everyday life - Virtual assistants – Recommendation Systems – Smart automations – AI in Industry – Emerging technologies – NLP, Computer Vision, Robotics – AI Research and Development – Ethical and privacy concerns.

Total Periods	30

Suggestive Assessment Methods

Continuous Assessment Test (30 Marks)	Formative Assessment Test (10 Marks)	End Semester Exams (60 Marks)
1. DESCRIPTIVE QUESTIONS **2. PROBLEM SOLVING**	**1. TUTORIAL PROBLEMS** **2. ASSIGNMENT** **3. QUIZZES**	**1. DESCRIPTIVE QUESTIONS** **2. PROBLEM SOLVING**

Outcomes

Upon completion of the course, the students will be able to:

CO1 : The Students will be able to articulate the definition, key concepts, history, and evolution of Artificial Intelligence, and distinguish between human and machine intelligence

CO2:The Students will be proficient in identifying and explaining the roles of different AI computing hardware (such as GPUs, TPUs, ASICs, and FPGAs) and software (including development frameworks and tools).

CO3: The Students will be adept at collecting, storing, and managing different types of data, while addressing ethical considerations.

CO4: The Students will be able to describe and apply core concepts of machine learning, including training, types of algorithms, and models.

CO 5: The Students will be able to identify and evaluate various AI applications in everyday life and industry, including virtual assistants, recommendation systems, and smart automations

Reference Books

1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig. (Unit I)
2. "Discrete Mathematics and Its Applications" by Kenneth H. Rosen(Unit I)
3. "Artificial Intelligence: A Guide for Thinking Humans" by Melanie Mitchell(Unit IV , V)
4. Nils J Nilsson, **Principles of Artificial Intelligence**, Illustrated Reprint Edition, Springer Heidelberg, 2014.(Unit III)
5. "AI and Machine Learning for Coders: A Programmer's Guide to Artificial Intelligence" (Unit II)

Web Resources
NPTEL : https://onlinecourses.nptel.ac.in/noc21_ge20/preview

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
1	3	3	2								2		3	
2	3	3	2		2						2		3	
3	3												3	
4	3												3	
5	3	3	2		2						2		3	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER					
UNDERSTAND	30	30	5	5	30
APPLY	60	60	15	15	60
ANALYZE					
EVALUATE					
CREATE					

CO 1: AI Problem Solving

1. Define a problem as a state space search and describe the components involved in this representation.
2. Compare and contrast different types of production systems and their characteristics.
3. Design a production system to solve the 8-puzzle problem. Clearly define the state space, set of rules, initial state, and goal state. Describe how your system would navigate from the initial state to the goal state.

CO 2: Heuristic Techniques Application

1. Explain the principle behind hill climbing and its limitations.
2. Using the best-first search technique, solve the provided maze problem. Outline each step of the search process and justify the choice of heuristic used.

CO3: Knowledge Representation Mastery

1. Explain the concept of the frame problem in AI.
2. Represent the following facts in predicate logic: "John is the father of Mary. Mary is the mother of Tom. Tom is a student." Provide the logical statements and discuss their computable functions and predicates.

CO4: Rule-Based Systems Development

1. Implement a simple logic program to solve a basic arithmetic problem.
2. Develop a rule-based system for diagnosing common computer network problems, detailing the rules and reasoning process.
3. Compare and contrast forward and backward reasoning with examples. Discuss in which scenarios each method is more advantageous.

CO5: Expert Systems Utilization

1. Analyze the role of memory organization in the efficiency of expert systems.
2. *Creating:* Design an expert system for diagnosing car engine problems. Define the domain knowledge, create a set of rules, and describe how the system will acquire and utilize knowledge to provide accurate diagnostics.

24HS1103	TAMIL HERITAGE	L	T	P	C
		2	0	0	1

Preamble: This course is offered to equip students to create awareness of the contribution of Tamil people to Indian culture by highlighting the characteristics of Tamil language and literature and exhibiting Tamil culture through traditional arts such as performing arts and fine arts.

Prerequisites for the course:

The prerequisite knowledge required to study this course is basic knowledge in English and Tamil Heritage.

UNIT I	LANGUAGE AND LITERATURE	6

Language Families in India-Dravidian Languages -Tamil as Classical Language -Classical Literature in Tamil - Secular Nature of Sangam Literature -Distributive Justice in Sangam Literature Management Principles in Thirukural -Forms of minor Poetry development of Modern literature in Tamil-Contribution of Bharathiyar and Bharathidhasan.

UNIT II	HERITAGE-ROCK ART PAINTINGS TO MODERN ART-SCULPTURE	6

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making- Massive Terracotta sculptures, Village Deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridangam, Parai, Veenai, Yazh and Nadhaswaram

UNIT III	FOLK AND MARTIAL ARTS	6

Therukoothu, Karakattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance-Sports and Games of Tamils.

UNIT IV	THINAI CONCEPT OF TAMILS	6

Flora and Fauna of Tamils & Agam and Puram Concept from Tholkappiyam and Sangam Literature -Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age-Export and Import during Sangam Age-Overseas Conquest of Cholas.

UNITV	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	6

Contribution of Tamils to Indian Freedom Struggle-The Cultural Influence of Tamils over the other parts of India - Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine-Inscriptions & Manuscripts-Print History of Tamil Books.

Total Periods : 30

Assessment Method

Continuous Assessment 1	Continuous Assessment 2
50 marks	50 marks

Course Outcomes:

CO1	To widen the knowledge on the characteristics of Tamil language and literature.
CO2	To explore the traditional Tamil fine arts and its techniques of Tamil Heritage.
CO3	To evaluate the various types of performing arts and their cultural context.
CO4	To get an insight on the lifestyle and living techniques of Tamil ancestors.
COS	To recognise and perceive the role played by Tamils in the unity and development of India.

CO PO Mapping:

CO	**PO 1**	**PO** 2	**PO** 3	**PO** 4	**PO** 5	**PO** 6	**PO** 7	**PO** 8	**PO** 9	**PO 10**	**PO 11**	**PO1** 2
1								1	2	3	1	3
2								1	3	2	3	2
3								1	3	2	1	2
4								3	2	2	3	2
5								2	3	3	2	3

TEXT-CUM-REFERENCE BOOKS

1. Social Life of Tamils (Dr.K.K.Pillay) *A* joint publication of TNTB & ESC and RMRL-(in print)
2. Social Life of the Tamils- The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5. Keeladi-'Sangam City Civilization on the banks of river Vaigai'(Jointly Published by:Department of Archaeology &TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
6. Studies in the History of India with Special Reference to TamilNadu (Dr.K.K.Pillay) (Published by: The Author)
7. Porunai Civilization(Jointly Published by:Department of Archaeology &TamilNadu Text Book and Educational Services Corporation,Tamil Nadu)
8. Journey of Civilization Industo Vaigai(R.Balakrishnan)(Published by:RMRL)-Reference Book.

24HS1103 I	தமிழர் மரபு	L	T	p	C
		2	0	0	1

(YI 6UT 6m I)' (Preamble)

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Total Periods	30
Assessment Method	

Continuous Assessment 1	Continuous Assessment 2
50 marks	50 marks

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CO PO Mapping:

CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
1								1	2	3	**1**	3
2								**1**	3	2	3	2
3								**1**	3	2	**1**	2
4								3	2	2	3	2
5								2	3	3	2	3

TEXT-CUM REFERENCE BOOKS

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24HS1101	PROFESSIONAL COMMUNICATION SKILLS	L	T	P	C
		2	**0**	2	3

Preamble

This course is offered to equip students with the necessary skills to listen, read, write, and speak so as to comprehend and successfully convey any idea, technical or otherwise, as well as give them the necessary polish to become persuasive communicators.

Prerequisites for the course

The prerequisite knowledge required to study this Course is the basic knowledge in English Language.

Objectives

1. Develop students' ability to critically analyze technical concepts and articulate them effectively through various communication methods (listening, speaking, reading, writing).
2. Equip students to analyze biographies, effectively introduce themselves, and articulate their personal and professional goals.
3. Enhance students' listening and speaking skills for clear communication in diverse situations. Improve writing abilities through creating dialogues, and solidify grammar and vocabulary knowledge.
4. Enhance students' ability to effectively analyze information, craft persuasive engineering content, and present it confidently.
5. Develop students' understanding of professionalism, enhance their communication skills related to company profiles and engineering projects, and strengthen their grammar and vocabulary in professional contexts.

Unit I	Sharing Basic Technical knowledge	12

Listening: Listening to basic technical concepts- Cloze test - Note making; **Speaking:** Short presentation on fundamental technical concepts - sentence structure - Key message - Storytelling - logical flow for a technical presentation - delivery techniques - principles of using effective visual aid; **Reading:** Articles on Technical concepts from journals - comprehension - define the content - identify the main ideas presented - note down the purpose of the content - Peer review; **Writing:** Short passages on technical topics - Write topic sentences for given prompts - develop and organize supporting sentences - organizing ideas into journals - jumbled sentences - Practice using transitional words and phrases; **Grammar:** Tenses - Present - Past - Future; **Language Development:** Synonyms - Antonyms

Unit II	Self-Introduction and Speaking Skills	12

Listening: Watch/Listen to videos on self introduction - vocabulary - phrases - analyzing the content - Note Making; **Speaking:** Self Introduction (Video Creation) - greeting - basic information - educational background - strengths and weaknesses - key skills relevant to

engineering - Extracurricular Activities and Interests - future goals and aspirations - conclusion; **Reading:** biography of eminent personalities - Early Life and Influences - Major Achievements and Innovations - Challenges and Resilience - Impact and Legacy; **Writing:** Greeting and Introduction - personal background - skills and strengths - personal interests - future aspirations; **Grammar:** Subject verb agreement; **Language development:** Word Formation - prefixes & suffixes - one word substitutions

Unit III	**Conversational Skills**	**12**

Listening: Listen to short audio dialogues on greetings, introductions, and small talk - Identify key vocabulary and conversational routines - Listen to podcasts or interviews on interesting topics - Identify main points, supporting arguments, and speaker opinions; **Speaking:** Practice greetings, introductions, and small talk in pairs - Role-play - conversation on technical topics - reviewing a gadget/products - merits and demerits; **Reading:** Reading short conversations - identify and analyze jargon used in various contexts, such as technology, medicine, finance, and marketing, through reading and analyzing short conversations; **Writing:** Write short dialogues based on learned greetings, introductions, and small talk phrases - write a short dialogue demonstrating effective communication strategies in a chosen scenario (e.g., negotiation, disagreement); **Grammar:** "Wh" Question - Yes/No Questions - Indirect questions - Adjectives; **Language Development:** Phrasal verbs .

Unit IV	**Persuasive Discourse Skills**	**12**

Listening: Listen to persuasive presentations by engineers, pitches to investors for engineering projects, and debates on engineering ethics or approaches - Identify and analyze the speaker's use of technical evidence, data visualization, rhetorical devices, and common logical fallacies in engineering contexts - Evaluate the effectiveness of different persuasive techniques used to convince stakeholders and audiences in the engineering field; **Speaking:** Develop and practice persuasive presentations on engineering projects, design solutions, or technical proposals - Focus on clear and confident delivery with strong vocal variety, body language, and effective use of visual aids like charts, diagrams, and 3D models - Participate in mock client meetings, design reviews, and engineering debates, employing logical reasoning, and ethical arguments - press conferences; **Reading:** Analyze persuasive engineering texts like proposals, reports, and articles; **Writing:** Social media description - blog writing - Product Description - White Paper writing - Product Release/Launch Notes - Write Journals on emerging trends; **Grammar:** Direct and Indirect Speech; **Language Development:** Technical Definitions

UnitV	**Professional & Career Skills**	**12**

Listening: Introduction to Professionalism - Professional ethics and responsibility - Workplace culture and diversity awareness - Time management and organizational skills; **Speaking:** Company profile - Introduction - Briefly introduce the company, its mission, and its products/services - Engineering Focus - Dive deeper into the company's engineering projects, showcasing the kind of work their engineers do - Use visuals and data if available - Culture and

Benefits - Briefly touch on the company culture, work environment, and any unique benefits they offer engineers (e.g., mentorship programs, professional development opportunities) - Career Opportunities - Mention potential career paths for engineers at the company and any internship or job openings; **Reading:** News Articles from Companies/Industries - Magazine Articles - Note Making - Comprehension; **Writing:** Writing about a company - engineering projects and technologies - problem the company solves - culture, benefits, and careers - Opinion Article - Checklists - Write prompts for the given scenario; **Grammar:** Question tags; **Language Development:** Compound words - Cloze test - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.

Total Hours: 60

S.No	List of Exercises	CO
1.	Assessment on 10 Videos on Basic Technical Concepts	CO 1
2.	Self-Introduction Video	CO 2
3.	Conversation - Audio Recording (10 Topics)	CO 3
4.	Presentation on the working principle of a gadget/Product	CO 4
5.	Writing about a Company	CO 5

Total Periods - 30 Theory +30 Lab

Continuous Assessment (20 Marks)	Lab Components Assessments (30 Marks)	End Semester Exams (50 Marks)
Written Examination	Completion of Suggested Exercises	Written Examination

Outcomes

Upon completion of the course, the students will be able to:

CO 1	Enumerate basic information using communication etiquette on par with international communication standards. (Apply)
CO2	Interpret fundamental technical concepts in English language giving importance to syntax. (Apply)
CO 3	Evaluate advanced varied technical concepts in the current scenario and emerging trends to invent new concepts. (Apply)
C04	Write solutions for problems identified using the exact vocabulary and structure without grammatical errors as expected by the corporate world. (Apply)

CO 5	Manage and respond to self, others' emotions using skills of Self Awareness, Self Management, Self Motivation, Empathy & Social Relations to be an Emotionally Intelligent Human Being. (Apply)

Text Books

1. Reynolds, John. Cambridge IGCSE.A® First Language English. 2018th ed., Hodder Education, 2018
2. Michael Swan, Practical English Usage (Practical English Usage), Jun 2017, 4th edition, Oxford University Press, UK

Reference Books

1. Michael Swan, Catherine Walter, Oxford English Grammar Course Advanced, Feb 2012, 4 th Edition, Oxford University Press, UK
2. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges.
3. Michael Swan, Practical English Usage (Practical English Usage), Jun 2017, 4th edition, Oxford University Press, UK

Web Resources

1. Selflntroduction: https:/ /youtu.be/Osa53-RYBk4
2. Working Principle of a Gadget: https://www.youtube.com/channel/UC6qf8AGvAGixZXWdxapvCqw
3. Podcast Channels : Huberman Lab - https:/ /www.hubermanlab.com/podcast
   The Diary of a CEO - https:/ /stevenbartlett.com/doac
   Times of India - https://timesofindia.indiatimes.com/podcasts
4. Product Review: https:/ /youtu.be/ByhA0Sx7CWI
5. Times of India: https:/ /timesofindia.indiatimes.com/home/headlines
6. Listening to Technical talks:
   Auto Car India https://m.youtube.com/user/autocarindial
   Lesics: https://www.youtube.com/channelfUCqZQJ4600a9wifMPbYc600Q
   Student Energy https:/ /www.youtube.com/user/studentenergy?app=desktop
7. Types of Listening https:/ /www.youtube.com/watch?v=22gzvSindTU&t=1s

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 01	PS 02	PS 03
1									1	3		2			
2									1	3		1			
3									1	3		2			
4									2	3		2			
5									1	3		1			

SUGGESTED COURSE LEVEL ASSESSMENT QUESTIONS:

COURSE OUTCOME 1 (CO 1) :

1) Listen to the talk on basic technical topics and answer the questions provided.
2) Introduce yourself in a professional way highlighting Characteristics, Strengths & Weaknesses.
3) Read the given technical passage and answer the questions provided.
4) Frame Yes/No Questions for the statements given.
5) Frame Question tags for the statements given.
6) Rearrange the jumbled words into a meaningful sentence.
7) Complete the sentence with the Noun form/ Verb Form/ Adjective form (as Directed) of the word given.
8) Give the expansion of the Abbreviations given.

COURSE OUTCOME 2 (CO 2) :

1) Listen to the technical lecture and answer the questions provided.
2) Introduce a device or a gadget to the class giving importance to its specifications, description, merits and demerits.
3) Read the given passage / short narrative / article from a journal or newspaper to the class.
4) Write your review on any one of the gadgets you are using.
5) Frame "Wh" Questions for the statements given.
6) Punctuate the following statement given.
7) Complete the sentence using the fragments given.
8) Write a short passage on the given topic.
9) Fill in the blanks with the suitable prefix or suffix as directed.

COURSE OUTCOME 3 (CO 3) :

1) Listen to the technical talk on the emerging trends and complete the statements given. (Cloze Test)
2) Ask questions to get an opinion about technical gadgets / software / devices
3) Read the given article from a journal and provide your ideas for further developments.
4) Rearrange the following jumbled sentences in the proper chronological order.
5) Write a short essay on any one of the given technical topics highlighting the future scope of the product.
6) Rewrite the following into Indirect Speech.
7) Frame indirect questions for the questions given.
8) Fill in the blanks with the suitable articles.
9) Give the one word substitutes for the given statement.

COURSE OUTCOME 4 (CO 4):

1) Listen to the technical talks and write down the merits and demerits of the product discussed.
2) Watch the video, evaluate the concept and express your solutions to the problem.

3) Read the given article and note down the problems stated.
4) Write down solutions for the problems faced while using a product.
5) Draft a white paper writing for the given situation..
6) Write launch notes for a product.
7) Convert the given statement to another form of the tenses as directed.
8) Pick out the suitable synonym for the underlined word in order to minimize plagiarism.
9) Fill in the blank with the suitable phrasal verb.

COURSE OUTCOME 5 (CO 5) :

1) Watch the video on Types of listening and answer the questions.
2) Make a presentation on the importance of Emotional Intelligence.
3) Read the given article on High level cognition and answer the questions.
4) Read the article on social behaviour and redraft it in your own style.
5) Comprehend the passage and give your inputs for decision making.
6) Watch the video and articulate your emotions using appropriate words.
7) Write a note on optimism and pessimism.
8) Fill in the blank with the suitable modal verb.
9) Pick out the suitable fixed/ semi-fixed expression to complete the given statement.

24PC1311	APPLIED PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

Preamble

The objective of this course is to enable students to develop their practical applications in the engineering sector by applying the concepts in an appropriate manner to modern technology and to gain practical knowledge that correlates with the theoretical studies.

Prerequisites

Basic practical concepts of Physics and Chemistry in higher secondary level.

Objectives (Physics)

- To demonstrate and to reinforce the theoretical concepts learned in physics lectures through practical experiments.
- To interrogate the competency and understanding of the basic concepts found in experimental physics.
- To gain knowledge of the practical applications of electronic mechanisms.
- To look into measurement and technique problems in experiments.
- To familiarize physics concepts and to design instruments and experimental sets for better and accurate measurements.

Objectives (Chemistry)

- To interpret the students by acquiring practical skills in the determination of water quality parameters quantitatively for industrial and fabrication processes through volumetric analysis.
- To develop an understanding about the range and uses of analytical methods in chemistry.
- To gain knowledge for the measurement pH of sample solutions to detect any potential environmental issues by measuring the hydrogen-ion activity in water-based solutions.
- To demonstrate the students with a practical approach towards the various techniques to monitor and control the quality of the treated water.
- To explain the concept of corrosion, its causes, and its environmental consequences.

PHYSICS

S.No	List of Experiments (Any five)	CO
1	Determination of Energy gap of a material of P-N Junction diode (Forbidden energy band gap kit).	4
2	Determination of Planck's constant and work function using the principle of photoelectric effect.	3
3	Determination of Young's modulus of the material - Non Uniform bending method.	2
4	Determination of thermal conductivity of a bad conductor - Lee's Disc method.	1
5	Determination of the velocity of sound and compressibility of liquids- Ultrasonic interferometer.	5
6	Study of I-V Characteristics of solar cell and determination of its efficiency	4
7	Study the characteristics of LED and LASER sources.	4

CHEMISTRY

S.No	List of Experiments (Any five)	CO
1	Analysis of water sample (hardness) for industrial applications and fabrication processes.	1
2	Estimation of iron in pharmaceutical samples by Potentiometry. (Electrochemical sensor).	2
3	Determination of acid concentration using pH metry (pH sensor).	3
4	Utilization of Conductometric analysis for determining the strength of NaOH	4

	solution.	
5	Corrosion Experiments - Weight loss method and Potentiometry.	5
6	Design a molecular structure using Chem Draw and a computational model.	2
7	Analysis of water (Alkalinity) for industrial and fabrication purposes.	1

List of Projects (PHYSICS)

S.No.	List of Projects	Related Experiment	CO
1	To study Infrared radiation emitted by different sources using phototransistors.	2	3
2	Design a circuit for cool automatic timer controlled Light which controls vehicle traffic passing through the intersection of two or more roadways by giving a visual indication to drivers when to proceed, when to slow, and when to stop using LED and 4017 counter IC along with the 555 timer.	7	4
3	Design temperature controlled circuits trigger automatically when the ambient temperature goes beyond a set limit of, say, 50 degrees centigrade. This temperature setting can be changed as per requirement through the potentiometer in the circuit.	4	1
4	Using ultrasonic sensor, design a ultrasonic distance finder using 8051	5	5
5	Design a water level indicator by connecting a Buzzer, resistor and transistor in series and connect this in parallel to LED.	7	4

List of Projects (CHEMISTRY)

S. No.	List of Projects	Related Experiment	CO
1.	Water Analysis: Analysis of perennial Thamirabarani River water samples collected from various locations (before and after blending of industrial waste water). **i)** Determination of various physical and chemical parameters (Hardness, pH, TDS, Alkalinity) of different	1,3	1,3

	water samples. **ii)** From the result, give a detailed report about the water sample whether it is fit/unfit for domestic and industrial purposes.		
2	Design the molecular structure of Biomolecules by computational methods.	2	2
3	Determination of thermal conductivity of Pure liquids and binary mixtures using IoT model (Temperature sensor and Turbidity sensor)	4	4
4	Air quality monitoring: Study of air pollution in Nellai smart city in the early morning, noon and evening due to CO/CO2 emissions by Arduino method. **i)** From the observations give a detailed report about the impact of air pollution on human health. **ii)** Deduce an explanatory report on environmental impact due to CO/CO2 emissions.	4	4
5	Food adulteration: Investigation of adulterants **in** various food stuffs milk, chilli powder, turmeric powder, wheat flour, honey and ghee) by Chemical methods. **i)** Give a report on the presence of adulterants in the given food samples. **ii)** From the observations give a brief report about the impactof food adulteration on human health.	5	5

Lab Assessment

Internal Assessment	**External Assessment**
(60 Marks)	**(40 Marks)**

Upon completion of the course, the students will be able to:

C01	Analyze the experimental data to determine thermal conductivity, enhancing their ability to understand and predict heat transfer in materials. (Analyze)
CO2	Analyze the bending of materials under load and relate the observed deformation to material properties. (Analyze)
C03	Interpret the experimental results to calculate the Planck's constant and the work function, reinforcing their understanding of the photoelectric principle. (Apply)
C04	Analyze the experimental data to develop practical skills and a deeper understanding of semiconductor devices and use this knowledge to design new experiments in engineering.(Analyze)

CO5	Gain a deeper understanding of the acoustic properties of liquids and enhance their practical laboratory skills. (Apply)

Outcomes (Chemistry)

C01	Analyze the water quality related parameters quantitatively for industrial and fabrication processes. (Analyse)
CO2	Interpret the use of equipment and accessories using analytical methods in chemistry. (Apply)
C03	Apply the use of equipment for the measurement pH of sample solutions to detect any potential environmental issues. (Apply)
C04	Apply the use of equipment for the measurement of conductance of sample solutions to monitor and control the quality of the treated water. (Apply)
CO5	Analyze the probable corrosion, corrosion rate, and corrosion mechanism of the metallic material in the given environment. (Analyze)

Reference Books (Physics)

- Physics Laboratory Manual, Department of Physics, Francis Xavier Engineering College, Tirunelveli.
- *A* Textbook of Engineering Physics Practical ,UNIVERSITY SCIENCE PRESS (An Imprint of Laxmi Publications Pvt. Ltd.)2nd edition.

Reference Books (Chemistry)

- **J.** Mendham, R.C. Denney, J.D.Barnes, M.Thomas and B.Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (5th edition 2009).

Web Resources (Physics)

Virtual Lab https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html Young's Modulus- https://vlab.amrita.edu/?sub=l&brch=280&sim=SS0&cnt=l

Virtual Lab - https://www.vlab.co.in/ba-nptel-labs-physical-sciences

https:/ /iitr.ac.in/ Academics/static/Department/Physics/Thermal%20Physics%20Laboratory/To_study _the_characteristics_of_Solar_cell--_Current_voltage_spectral_and_illumination..pdf

Web Resources (Chemistry)

- Water Quality standards - https://www.youtube.com/watch?v=OlGllOZliyI
- Corrosion experiments - weight loss method https://www.youtube.com/watch?v=SMlg WfdB
- Chem draw basics- https://youtu.be/a9r4Ofnc-Ro?si=IkzbsfFP_eUKBvU4

CO Vs PO Mapping and CO Vs PSO Mapping – Physics

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	3	2	1	3	3							1			
2	3	2	1	3	3							1			
3	3	2	1	3	3										
4	3	2	1	3	3		2					1			
5	3	2	2	3	3							1			

CO Vs PO Mapping and CO Vs PSO Mapping - Chemistry

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	3	2	2			3	3	2				2			
2	3	2	2			3		2	2			2			
3	3	2	2			3		2	2			2			
4	3	2	2			3		2	2			2			
5	3	2	2			3	3	2	2			2			

COURSE LEVEL ASSESSMENT QUESTIONS – PHYSICS

COURSE OUTCOME 1: Analyze the experimental data to determine thermal conductivity, enhancing their ability to understand and predict heat transfer in materials.(Analyze)

1. Determine the thermal conductivity of a given bad conductor (Glass) using Lee's disc method. (Given: M= 800 $X10^{-3}$ Kg, S = 370 $JKg^{-1}K^{-1}$).

COURSE OUTCOME 2: Analyze the bending of materials under load and relate the observed deformation to material properties.(Analyze)

1. Find out the Young's modulus of the material of a beam using Non-Uniform bending method. (Given: Thickness of the beam d = 6.35 mm)

COURSE OUTCOME 3: Interpret the experimental results to calculate the Planck's constant and the work function, reinforcing their understanding of photoelectric principle. (Apply)
1. Determination of planck's constant and work function using the principle of photoelectric effect.

COURSE OUTCOME 4: Analyze the experimental data to develop practical skills and a deeper understanding of semiconductor devices, and use this knowledge to design new experiments in engineering. (Analyze)
1. Determination of band gap of a Semiconductor (Forbidden energy band gap kit).
2. Study the V-I characteristics of LED and laser diode
3. Find out the fill factor of a given solar cell.

COURSE OUTCOME 5: Gain a deeper understanding of the acoustic properties of liquids and enhance their practical laboratory skills. (Apply)
1. Determination of velocity of sound and compressibility of liquid - Ultrasonic Interferometer.

COURSE CONTENT AND LECTURE SCHEDULE - PHYSICS

S.No.	TOPIC	NOOF WEEKS REQUIRED
1	Determination of band gap of a Semiconductor diode (Forbidden energy band gap kit).	1
2	Determination of planck's constant and work function using the principle of photoelectric effect.	1
3	Determination of Young's modulus of the material-Non Uniform bending method.	1
4	Determination of thermal conductivity of a bad conductor - Lee's Disc method.	1
5	Determination of velocity of sound and compressibility of liquid - Ultrasonic Interferometer	1
6	To find out the fill factor of a given solar cell.	1
7	To study V-I characteristics of LED and laser diodes.	1

ASSESSMENT QUESTIONS - CHEMISTRY

COURSE OUTCOME 1: Analyze the water quality related parameters quantitatively for industrial and fabrication processes. (Analyse)

1. You are the Quality Control Engineer at a manufacturing plant that produces precision metal components for the automotive industry. Your plant uses water extensively in various fabrication processes, including cooling systems, rinsing, and cleaning parts. Perform a hardness test on the given water sample using a titration method with EDT*A* (Ethylene diaminetetra acetic acid) as the titrant. Record the total hardness in ppm (parts per million) of calcium carbonate ($CaCO_3$).

COURSE OUTCOME 2: Interpret the use of equipment for the measurement of electrode potential of solutions. (Apply)

1. You are a quality control engineer working in a pharmaceutical company that produces iron supplements. To ensure that each batch meets regulatory standards and contains the correct amount of iron, you need to determine the iron content in a pharmaceutical sample using potentiometric titration. The sample contains ferrous sulfate ($FeSO_4$) as the iron source.

COURSE OUTCOME 3: Apply the use of equipment for the measurement pH of sample solutions to detect any potential environmental issues. (Apply)

1. You are an environmental scientist working on a project to monitor the pH of water sources in a nature reserve to ensure the ecosystem's health. Accurate pH measurements are crucial to detect any potential environmental issues, such as acid rain or pollution. Analyse the given water sample with the use of a pH meter equipped by a glass electrode.

COURSE OUTCOME 4: Apply the use of equipment for the measurement of conductance of sample solutions to monitor and control the quality of the treated water. (Apply)

1. You are an engineering intern at a water treatment facility. The facility is implementing a new process to monitor and control the quality of the treated water. One of your tasks is to measure the conductance of various water samples using a conductivity meter to ensure that the treated water meets the required standards for ion content. Analysethe given water sample with the use of a conductivity meter equipped by a conductivity cell.

COURSE OUTCOME 5: Analyze the probable corrosion, corrosion rate, and corrosion mechanism of the metallic material in the given environment (Analyze)

1. You are an engineering consultant for a company that operates offshore oil rigs. One of the key components of the rig is a pipeline made of carbon steel, which transports crude oil from the seabed to the surface. The pipeline is exposed to a harsh marine environment, including saltwater, varying temperatures, and mechanical stresses. Your task is to analyze the probable corrosion and corrosion rate of the carbon steel pipeline in this environment.

COURSE CONTENT AND LECTURE SCHEDULE - CHEMISTRY

S.No.	TOPIC	NOOF WEEKS REQUIRED
1	Analysis of water sample(hardness) for industrial applications and fabrication processes.	1
2	Estimation of iron in pharmaceutical samples by Potentiometry (Electrochemical sensor).	1
3	Determination of acid concentration using pH metry.(pH sensor).	1
4	Utilization of conductometric analysis for determining the strength of solution.	1
S	Corrosion Experiments - weight loss method and potentiometry	1
6	Design a molecular structure using ChemDraw and a computational model.	1
7	Analysis of water (Alkalinity) for industrial and fabrication purposes.	1

24CS1511	PROGRAMMING PRACTICE LAB USING C	L	T	P	C
		0	0	4	2

Preamble

The goal of the practice lab is to provide the students with foundation in computer programming to enhance the problem solving skills related to the field of engineering. It enables the algorithmic approach among the students to solve real world problems thus providing the base to learn other new programming languages

Prerequisites for the course

- **NIL**

Objectives

1. To develop C programs using conditional and looping statements
2. To be able to use arrays and strings in C
3. To build modular programs using functions in C
4. To explicitly manage memory using pointers in C
5. To develop applications in C using structures and files

S.No	List of Experiments	CO
1	Programs using simple statements	CO1
2	Programs using decision making statements	CO1

3	Programs using looping statements	COl
4	Programs using one dimensional and two dimensional arrays	CO2
5	Programs using strings.	CO2
6	Programs using user defined functions and recursive functions	CO3
7	Programs using functions and pointers	CO3
8	Programs using structures and pointers	CO4
9	Programs using structures and unions	CO4
10	Programs using file concept	CO4

S.No.	List of Projects	Related Experiment	CO
1.	Vaccine Status Registration System	Ex. 1 to 10	COS
2.	Toll Bill Management system	Ex. 1 to 10	COS
3.	Voting Eligibility system	Ex. 1 to 10	COS
4.	Cricket Scorecard Display system	Ex. 1 to 10	COS
5.	Medical History Viewing System	Ex. 1 to 10	COS
6.	Bus/ Flight Ticket Reservation System	Ex. 1 to 10	COS
7.	Vehicle Parking Control System	Ex. 1 to 10	COS
8.	Canteen Menu Management System	Ex. 1 to 10	COS
9.	Grocery Checklist Management System	Ex. 1 to 10	COS
10.	Diary Management System	Ex. 1 to 10	COS
11.	Retail Shop Inventory Management System	Ex. 1 to 10	COS
12.	Pharmacy Inventory System	Ex. 1 to 10	COS
13.	Library Book Management System	Ex. 1 to 10	COS
14.	Student Subject Selection System	Ex. 1 to 10	COS
15.	Student Leave Application System	Ex. 1 to 10	COS

Suggestive Assessment Methods

Lab Components Assessments (50 Marks)	End Semester Exams (50 Marks)
1. Exercises (Hacker rank score) 2. Project File (Progress Score) 3. Viva voce	1. Record note 2. Exercises 3. Viva voce

Course Outcomes

Upon completion of the course, the students will be able to:

COl	Implement program using control statements

CO2	Implement arrays and perform string operations
CO3	Develop reusable modules, store data in main memory effectively using pointers
CO4	Form heterogeneous data using structures, union and files
COS	Build a project based on the required concepts learnt in C

Laboratory Requirements

- C compiler
- System with windows
- Internet

Reference Books

1. Reema Thareja, "Programming in C",Oxford University Press, Second edition, 2016

Web Resources

1. https://www.hackerrank.com/
2. https://www.codechef.com/selflearning?itm_medium=navmenu&itm_campaign=learncp
3. https:/ /www.hackerearth.com/practice/basic-programming/input-output/basics-of-input-output/ tutorial/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	POS	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3										1		
2	3	3	3										1		
3	3	3	3										2		
4	3	3	3										2		
5	2	2	2			1			2	2	2	1	3		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	Model Exam	END SEM EXAM
REMEMBER		
UNDERSTAND		
APPLY	50	100
ANALYZE		
EVALUATE		
CREATE	50	

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: (Blooms Category: Apply) (Problem Source: Code chef)

Problem Statement:

Pooja would like to withdraw X $US from an ATM. The cash machine will only accept the transaction if Xis a multiple of 5, and Pooja's account balance has enough cash to perform the withdrawal transaction (including bank charges). For each successful withdrawal the bank charges 0.50 $US dollars. Calculate Pooja's account balance after an attempted transaction.

Input Constraints:

Positive integer 0 < X <= 2000 - the amount of cash which Pooja wishes to withdraw.

Nonnegative number 0<= Y <= 2000 with two digits of precision -To represent Pooja's initial account balance.

Output Constraints:

Output the account balance after the attempted transaction, given as a number with two digits of precision. If there is not enough money in the account to complete the transaction, output the current bank balance.

Example:

TYPE	INPUT		OUTPUT
Successful Transaction	30	120.00	89.50
Incorrect Withdrawal Amount (not multiple of 5)	42	120.00	120.00
Insufficient funds	300	120.00	120.00

COURSE OUTCOME 2: (Blooms Category: Apply) (Problem Source: Code chef)

Problem Statement:

Write a program that takes in a letter class ID of a ship and display the equivalent string class description of the given ID. Use the table below.

Class ID	Ship Class
B orb	Battle Ship
C or c	Cruiser
D ord	Destroyer
For f	Frigate

Input Constraints:

The first line contains an integer T, the total number of test cases. Then T lines follow, each line contains a character. 1 :5 T :5 1000

Output Constraints:

For each test case, display the Ship Class depending on ID, in a new line.

Example:

INPUT	OUTPUT
3 B C D	Battleship Cruiser Destroyer

COURSE OUTCOME 3: (Blooms Category: Apply) (Problem Source: Hacker rank)

Problem Statement:

Functions are a bunch of statements grouped together. *A* function is provided with zero or more arguments, and it executes the statements on it. Based on the return type, it either returns nothing (void) or something. For example, a function to read four variables and return the sum of them can be written as

```
int sum_of_four(int a, int b, int c, int d) {
int sum= O;
        sum+= a;
        sum+= b;
        sum+= c;
        sum+= d;
        return sum;                }
```

+= : Add and assignment operator. It adds the right operand to the left operand and assigns the result to the left operand. So a += b is equivalent to a = a + b;

Task

Write a function int max_of_four(int a, int b, int c, int d) which reads four arguments and returns the greatest of them. Nate that it is not built in max function in C. Code that will be reused is often put in a separate function that returns the greater of the two values.

Input Constraints:

Input will contain four integers(one on each line)

Output Constraints:

Print the greatest of the four integers.

Sample Input:3 4 6 5

Sample Output: 6

COURSE OUTCOME 4: (Blooms Category: Apply) (Problem Source: Hacker rank)

Problem Statement:

You are transporting some boxes through a tunnel, where each box is a parallelepiped, and is characterized by its length, width and height. The height of the tunnel feet and the width can be assumed to be infinite. *A* box can be carried through the tunnel only if its height is strictly less than the tunnel's height. Find the volume of each box that can be successfully transported to the other end of the tunnel. Note: Boxes cannot be rotated.

Input Constraints:

The first line contains a single integer, denoting the number of boxes. Lines follow with three integers on each separated by single spaces, and which are length, width and height in feet of the box.

Output Constraints:

For every box which has a height lesser than 41 feet, print its volume in a separate line.

SAMPLE INPUT	SAMPLE OUTPUT
4 5 5 5 1 2 40 10 5 41 7 2 42	 125 80

COURSECONTENTANDLECTURESCHEDULE

S.NO	TOPIC	NO OF HOURS REQUIRED FOR EXERCISES	NO OF HOURS REQUIRED FOR PROJECT
1	Simple Statements	2	1
2	Decision Making Statements	2	1
3	Looping Statements	2	1
4	One Dimensional And Two Dimensional Arrays	2	1
5	Strings	2	1
6	Functions: User Defined Functions And Recursive Functions	2	1
7	Functions And Pointers	2	1
8	Structures And Pointers	2	1
9	Structures And Unions	2	1
10	Files Concept	2	1
11	Project Implementation & Integration	0	15
	Total	20	25
	Total Hours Required	45	

24GE1511	Engineering Practices Laboratory	L	T	P	C
		0	0	4	2

Prerequisites for the course

Basic Science

Objectives

To provide exposure to the students with hands-on experience in various basic engineering practices in Civil, Mechanical, Computer Science, Electrical, and Electronics Engineering.

S.No	List of Experiments	CO
	BASIC EMBEDDED SYSTEM (ECE)	
1	Control LED with Arduino Board and Tinker cad software.	COl
2	Control LED with push button	COl

3	Demonstrate RGB LED Color Mixing with Arduino in Tinker cad	COl
4	Demonstrate LCD Display with Arduino.	COl
5	Design a system to demonstrate a street traffic light system.	COl
6	Read data from a sensor and experiment with both Analog and Digital sensors.	COl
7	Interface Soil Moisture Sensor with Arduino	COl
8	Interface Gas Sensor with Arduino	COl
9	Interface Ultrasonic Distance Sensor with Arduino	COl
10	Interface PIR Sensor with Arduino	COl
	ELECTRICAL BOOTH (EEE)	
11	Residential house wiring using switches, fuse, indicator, lamp, and energy meter.	CO2
12	Fluorescent lamp wiring.	CO2
13	Staircase wiring	CO2
14	Measurement of electrical quantities - voltage, current, power in Electrical circuit.	CO2
15	Measurement of energy using a single phase energy meter	CO2
	ASSEMBLING AND DISMANTLING OF ELECTRICAL APPLIANCES (EEE)	
16	Dismantling and Assembling of Iron box	CO3
17	Dismantling and Assembling of fan	CO3
18	Dismantling and Assembling of Mixie	CO3
19	Dismantling and Assembling of Induction stove	CO3
20	Introduction to PLC programming	CO3
	BASIC CIVIL TOOLS AND SURVEYING (CIVIL)	
21	Introduction to Construction Tools	CO4
22	Visual inspection and Quality check on Bricks	CO4
23	Visual inspection and Quality check on Cement	CO4
24	Visual inspection and Quality check on Aggregates	CO4
25	Introduction to Surveying and Basic Tools	CO4
26	Field Measurements- Ranging and Marking	CO4
27	Detection and Correction of errors in field measurements	CO4
	OS INSTALLATION (CSE)	
28	Disk formatting, partitioning, and Disk operating system commands	**COS**
29	Install, upgrade, and configure Windows/Linux	**COS**

	operating systems	
30	Installation of Dual OS	COS
31	Installation Antivirus and configure the antivirus	COS
32	Installation of printer and scanner software	COS
	ASSEMBLING & DISMANTLING OF COMPUTER HARDWARE (CSE)	
33	Assembly and Disassembly of hardware	C06
34	Troubleshooting and Managing Systems	C06
35	Study of basic network commands	C06
36	Establish network connections	C06
37	Remote desktop connections and file sharing	C06
	DESIGN & 3D PRINTING (MECHANICAL)	
38	Introduction to Additive Manufacturing and basic machine handling methodologies.	CO?
39	Modeling Creative Designs in CAD Software.	CO?
40	Generating STL files from the CAD Models & Working on STL files.	CO?
41	Printing the part in STL format.	CO?
42	Evaluating the fabricated part for its suitability to a given application in terms of its fit, surface finish & dimensional accuracy.	CO?
	WELDING (MECHANICAL)	
43	Welding tools and techniques, preparation of butt joints.	COB
44	Preparation oflap and T Joints by shielded metal arc welding.	COB

Outcomes

Upon completion of the course, the students will be able to:

cot	Interface Embedded Processors with 1/0 devices
CO2	Carry out wiring and electrical measurements for residential installations.
CO3	Carry out assembling and dismantling of electrical home appliances
CO4	Conduct quality checks on construction materials and error correction in field measurements
COS	Install and configure Windows and Linux operating systems.
CO6	Identify the basic hardware components

C07	Distinguish the basic concepts of additive manufacturing and its applications
C08	Use welding equipment to join the structures and sheet metal works

Laboratory Requirements

	ELECTRONICS	
1	Arduino UNO	30 Nos.
2	LCD Display	5 each
3	Soil Moisture Sensor	5 each
4	Gas Sensor	5 each
5	Ultrasonic Distance Sensor	5 each
6	PIR Sensor	5 each
	ELECTRICAL	
1	Single and Two way Switches, Fuses,	10 each
2	Voltmeter, Ammeter, Wattmeter, Energy meter	5 each
3	Iron Box, Fan	5 each
4	Mixie, Induction Stove	5 each
5	PLC kit	2 each
6	Fluorescent lamp	5 each
	CIVIL	
1	Trowel, Shovel and Pan	5 Nos.
2	Weighing balance	2 Nos.
3	Measuring tape and cross staff	5 Nos.
4	Arrows and Ranging rods	10 Nos.
5	Marking twine	5 Nos.
6	Chalk powder	10 kg
	COMPUTER SCIENCE	
1	Computer System (Processor, RAM, HarddisK, Motherboard)	3 Nos
2	OS setup in Pendrive	3 Nos
3	Network Switch	1 Nos
4	Jack crimped UTP Cable (3 metre)	10 Nos
5	RJ 45 connector	6 Nos
	MECHANICAL	
1	3D - Design software with systems	30
2	3D printing machine	02
3	Arc welding transformer with cables and holders	05
4	Welding booth, accessories with exhaust facility	05

Reference Books

1. K.Jeyachandran, S.Natarajan & S, Balasubramanian, "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007)
2. T.Jeyapoovan, M.Saravanapandian&S.Pranitha, "Engineering Practices Lab Manual", Vikas Publishing House Pvt. Ltd, (2006)
3. H.S. Bawa, "Workshop Practice", Tata McGraw - Hill Publishing Company Limited, (2007)
4. A.Rajendra Prasad & P.M.M.S. Sarma, "Workshop Practice", Sree Sai Publication, (2002).
5. Simon Monk ,"Programming Arduino: Getting Started with Sketches" Mc Graw hill,2012
6. Gibson, I, Rosen, D W., and Stucker, B., Additive Manufacturing Methodologies: Rapid Prototyping to Direct Digital Manufacturing, Springer, 2015
7. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain, Surveying (Volume -I and 11), Lakshmi Publications, 17th Edition, 2016
8. RON GILSTER, "PC Hardware: *A* Beginner's Guide". (CSE)
9. Chris Rhodes, MVP, Andrew Bettany, MVP, "Windows Installation and Update Troubleshooting". (CSE)

Web Resources

https://youtube/EJEz6t5SpMw?si=dUvXVwj7_rcmd3jF
https://www.youtube.com/watch?v=wAjkSj3ZjLs
https://www.youtube.com/watch?v=Zdj-nUYOfKk
https://www.youtube.com/watch?v=yrAdEaLzIK4
https://youtu.be/ AmXBRzizPMI?si=tK4roYcYaBPDwXuf
https://youtu.be/kOUu7LJuV7M?si=fjkeHd86NHLPZdZp

CO Vs PO Mapping

CO	PO1	PO2	PO3	PO4	POS	PO6	PO7	PO 8	PO9	PO1 0	PO 11	PO12
1	3	3	3	3	3							
2	3	2	2	2	1	2		2	3		2	2
3	3	2	2	2	1	2		2	3		2	2
4	3	3	2	2	3				2		2	2
5	3	2	2	2								
6	3	3	3	2	1							
7												
8												

SEMESTER II

S.No	Course Code	Course Name	Category	Contact Periods	L	T	P	C
Theory Courses								
1	24HS2101	Technical Communication Skills	**HSSM**	2	2	0	0	2
2	24MA2201	Complex Analysis and Fourier Series	**BS**	4	3	1	0	4
3	24CS2501	Introduction to Computing using Python	**ES**	3	3	0	0	3
4	24EE2501	Fundamentals ofElectrical and Electronics Engineering	**ES**	3	3	0	0	3
5	24ME1501	Engineering Graphics	**ES**	4	2	0	4	4
6	24GE2901	Design Thinking	**EEC**	1	1	0	0	1
7	24HS2103	Technology in Tamil Culture/ §JuSl!J)@LO §jQ§)TTk{$16U lDJLu UPLb	**HSSM**	1	1	0	0	1
Practical Courses								
1	24CS2511	Python Programming Laboratory	**ES**	4	0	0	4	2
			Total	22	15	1	8	**20**

24HS2101	TECHNICAL COMMUNICATION SKILLS	L	T	P	C
		2	0	0	2

Preamble

This course is offered to develop strategies and skills to enhance professional students' ability to read and comprehend engineering and technology texts. Foster their ability to write convincing job applications and effective reports. Develop their speaking skills to make technical presentations, participate in group discussions. The outcome of the course is to help students acquire the language skills of listening, speaking, reading and writing competency in English language thereby making them meet the global expectations.

Prerequisites for the course

- The prerequisite knowledge required to study this Course is the basic knowledge in English Language.

Objectives

1. To widen strategies and skills to augment ability to read and comprehend engineering and technology texts.
2. To draft convincing job applications and effective reports.
3. To develop speaking skills to make technical presentations, participate in group discussions.
4. To strengthen listening skills to comprehend technical lectures and talks in their areas of specialization.
5. To cultivate writing skills both technical and general.

UNIT 1	READING AND STUDY SKILLS	6

Reading - Reading longer technical texts / technical blogs and taking down notes; **Writing** - interpreting charts (all the types), graphs - comparing and contrasting statements/paragraphs - analyzing technical details - writing technical blogs - Drafting lab reports, writing clear and concise emails to professors and colleagues, composing technical summaries of research articles; **Vocabulary Development** - Select Technical Vocabulary; **Language Development** - Active Voice and Passive Voice

UNIT2	INTRODUCTION TO PROFESSIONAL WRITING	6

Reading - Technical related topics; **Writing** - statement of purpose - press release - extended definitions - writing instructions - recommendations -Minutes of the Meeting - Writing - user manual development for a chosen engineering tool, safety protocol development for a specific engineering lab; **Language Development** - Subject Verb Agreement, Compound Words.

UNIT 3	INTERVIEW SKILLS	6

Reading- newspaper article - read company profile - practice in speed reading ; **Writing** - Job Application - Resume- Internship application - letter to the editor - email etiquette - positive, negative and neutral responses - sending professional emails; Writing opinion paragraph - Writing paragraphs with reasons; **Vocabulary Development** - select Technical Vocabulary; **Language Development** - If - Conditionals		
UNIT 4	**REPORT WRITING** I	6
Reading - Analyzing research articles on emerging technologies in engineering, white papers on future engineering trends, identifying potential research opportunities; **Writing** - Fire Accident Report - Industrial Visit Report - Project Report; **Vocabulary Development-** finding suitable synonyms - paraphrasing; **Language Development** - Clauses.		
UNIT 5	**REPORT WRITING** II	6
Reading - Analyzing project management documents, work breakdown structures (WBS), and Gantt charts, evaluating project feasibility and timelines; **Writing** - Writing Feasibility Reports, Survey Reports; **Vocabulary Development** - verbal analogies ; **Language Development** - Prepositional Phrases.		
	Total Periods	**30**

Suggestive Assessment Methods

Formative Assessment (20 Marks)	Continuous Assessment (20 Marks)	End Semester Exams (60 Marks)
(i) Google Form based - on-line Test incorporating Listening, Speaking and Reading	Written Test	Written Test

Outcomes

Upon completion of the course, the students will be able to:

C01	Understand advanced technical texts from varied technical genres to understand engineering concepts and explore more. (Apply)
CO2	Review technical contents written on par with international standards and rewrite contents using the right vocabulary without grammatical errors to make their articles published in reputed journals. (Apply)
C03	Develop polished resumes and job applications tailored to specific roles, effectively highlighting their qualifications and enhancing their chances of securing desired employment opportunities. (Apply)
C04	Write reports utilizing the required format prescribed on par with international standards using the exact vocabulary to make their reports worthy to be read. (Apply)

C05	Appraise the need for new products and write feasibility and survey reports following the format prescribed in a way to create awareness. (Apply)

Text Books

1. Mike Markrl. Technical Communication,Palgrave Macmillan: London, 2012.
2. Sumant,S and Joyce Pereira. Technical English II. Chennai: Vijay Nicole Imprints Private Limited, 2014.
3. Kumar, Sanjay and Pushp Lata. Communication Skills: A Workbook. New Delhi: OUP, 2018.

Reference Books

1. Raman, Meenakshi & Sangeetha Sharma. Communication Skills. New Delhi: OUP, 2018
2. Rizvi M, Ashraf. Effective Technical Communication. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2007

Web Resources

1. Interpretation of Charts: https://youtu.be/4lxA7lo9GLU: https://www.englishhints.com/charts-and-graphs.html
2. Instructions https://www.wikihow.com/Write-Clear-Instructions
3. Resume building https://novoresume.com/career-blog/how-to-write-a-resume-guide
4. Report writing- https://www.youtube.com/watch?v=FXIuHOFAxos; https:/ /www.deakin.edu.au/students/ studying/ study-support/academic-skills/report-writing
5. UPSC Interview: https://www.youtube.com/watch?v=OhJWg-OqdIO

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 01	PS 02	PS 03
1										3		1			
2										3		1			
3										3					
4										3					
5										3		2			

SUGGESTED COURSE LEVEL ASSESSMENT QUESTIONS:

COURSE OUTCOME 1 (CO 1):

1) Read the given passage and take notes.
2) Analyse the given type of chart or graph and answer the questions given.
3) Analyse the given chart or graph and write paragraphs comparing and contrasting the data.
4) Analyse the given chart or graph and write paragraphs giving importance to technical details.
5) Fill in the blank with appropriate technical vocabulary.
6) Convert the given active voice sentence into passive voice or impersonal passive voice.

COURSE OUTCOME 2 (CO 2) :

1) Write a purpose statement for the tool or gadget given.
2) Write an extended definition for the given word.
3) Write 8 instructions / recommendations on the given topic.
4) Write the Minutes of the meeting for the given meeting.
5) Fill in the blank with appropriate Subject Verb agreement.
6) Fill in the blank with suitable compound words.

COURSE OUTCOME 3 (CO 3) :

1) Listening to mock interviews and answering the questions.
2) Listen to the strategies of GD and answer the given questions.
3) Read and submit a recording of technical content following the strategies of speed reading.
4) Write Job application with a cover letter for the given job description.
5) Write paragraphs expressing opinion on the given topic.
6) Fill in the blank/ complete the sentence with appropriate If-Conditionals.

COURSE OUTCOME 4 (CO 4):

1) Write a fire accident report for the provided incident.
2) Write an Industrial visit report.
3) Write a report on the Project work undertaken by the candidate giving importance to the current status report and the time needed for the completion of the project.
4) Find the appropriate synonym for the given word.
5) Paraphrase the given passage.
6) Fill in the blank with appropriate clauses.

COURSE OUTCOME 5 (CO 5) :

1) Write a Feasibility report for a business/ project proposal given.
2) Write a survey report for the given scenario.
3) Pick out the appropriate Verbal Analogy.
4) Fill in the blank with appropriate articles.
5) Complete the sentence with appropriate Prepositional Phrases.
6) Choose the appropriate word to complete the sentence.

24MA2201	COMPLEX ANALYSIS AND FOURIER SERIES	L	T	P	C
		3	1	0	4

Preamble:

The course consists of topics in Complex Integration, Partial Differential Equations and Laplace Transforms with applications to various engineering problems. This course will cover the following main topics: Construction of analytic function, Taylor's and Laurent's series, Poles and Residues, Half range sine series, Harmonic analysis, Fourier Series Solutions of one Dimensional wave and heat flow equation and Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients.

Pre requisites for the course

24MA1201- Matrices and Multivariable Calculus

Objectives

1. To introduce to the concept of Analytical function
2. To familiarize with Complex integration
3. TointroduceFourierseriesanalysiswhichiscentraltomanyapplications in engineering field and its use **in** solving boundary value problems
4. To acquaint the student with PDE and Fourier series techniques in solving wave and heat flow problems used in various situations.
5. To improve the knowledge of Laplace transforms.

UNIT I	ANALYTIC FUNCTIONS	9+3

Definition of Analytic Function - Cauchy Riemann equations - Properties of analytic functions Harmonic function-Harmonic Conjugate-Construction of analytic function by Milne's Thomson method and bilinear transformation- transformation w=l/z.

UNIT II	COMPLEX INTEGRATION	9+3

Complex numbers and its conjugate-Cauchy's Integral theorem (without proof) - Cauchy's Integral formula and its higher order derivatives (without proof) and its applications - Taylor's and Laurent's series - Types of Singularities - Poles and Residues - Cauchy's residue theorem (without proof).

UNIT III	FOURIER SERIES	9+3

Dirichlet's conditions - General Fourier series- Change of Intervals - Odd and even functions -Half range sine series-Half range cosine series-Root mean square value-Harmonic analysis For Fourier series-Engineering Applications.

UNIT IV	PDE AND APPLICATIONS OF FOURIER SERIES	9+3

Classification of PDE -Method of separation of variables- Fourier Series Solutions of one dimensional wave equation-Fourier Series Solutions of one dimensional equation of heat conduction-Engineering Applications.

UNIT V	LAPLACE TRANSFORMS	9+3

Properties of Laplace Transform-Inverse transforms-Convolution theorem(Without Proof)-Partial fraction-Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only -Engineering Applications.

Total Periods - 45+15=60 Period

Suggestive Assessment Methods!

Continuous Assessment Test (20Marks)	Formative Assessment Test (20Marks)	End Semester Exams (60Marks)
1. Descriptive Questions	l.Assignment 2. Online Quizzes	1. Descriptive Questions

Outcomes

Upon completion of the course, the students will be able to:

COl: Apply Cauchy-Riemann equations to problems of fluid mechanics, thermodynamics and electro-magnetic fields. (Apply)

CO2: Solve complex valued integral functions using residues. (Apply)

CO3: Construct the Fourier series expansion of the periodic function. (Apply)

CO4: Solve the problems of one dimensional wave and heat equation.(Apply)

COS:Apply Laplace transform technique to solve the given ordinary differential equations (Apply)

Text Books

1. B. S. Grewal, "Higher Engineering Mathematics", 45rdedition,2017.
2. Kreyszig. E, "Advanced Engineering Mathematics", John Wiley & Sons. Singapore 15th edition, 2017.
3. Glyn James, Advanced Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2010.

Reference Books

1. N. P. Bali, Dr. Manish Goyal, A Text book of Engineering Mathematics, University Science Press, 9th Edition, 2016.
2. Advanced Engineering Mathematics, H.K.DASS, S. CHAND and Company Limited, New Delhi, 22ndrevised edition,2018.
3. Xin She Yang, Mathematical Modeling for Earth Science, Dunedin Academic Press, 2008.

Web Resources

1. Analytic functions-https://youtu.be/bSVUnapu-qs
2. Complex Integration-https://youtu.be/4yC4IXcMKJg
3. Fourier series - https://youtu.be/LGxE_yZYigI
5. Applications of Fourier series-https://youtube/YfGHNdVeyB4
6. Laplace Transform - https://youtu.be/c9NibpoQjDk

COURSE LEVEL SAMPLE QUESTIONS:

COURSE OUTCOME (CO 1):

1) In designing electrical circuits, sometimes it's necessary to map components from one domain to another. Consider a scenario where you have a circuit represented in the complex plane, Identify the critical points of this transformation $w = z^2$
2) Consider a complex-valued function $f(z) = (2x + ay) + i(4x + by)$ where z is a complex number. For what values of a and b the function $f(z)$ is analytic.

COURSE OUTCOME (CO2) :

1) Consider a structural analysis project where historical data suggests that the behavior of a structure under weather conditions follows a Cauchy sequence of the function f(z) = $\frac{z}{(z-1)(z-2)^2}$over the region $|z-2| = 1/2$.The project aims to model the system and make predictions about the structure's response in the coming decades

(i) In what aspects of the structural response can be effectively captured over the region $|z-2| = 1/2$.

(ii) Explore the convergence point of the structure?

2) In investigating the flow of fluid around an obstacle in a closed channel. You need to calculate the circulation of the fluid around the obstacle to understand its impact on the overall flow pattern

(i) Discuss how the function f(z) = $\frac{1}{(z^2+4)^2}$ arises in the fluid dynamics scenario described by the poles and its relevance to the circulation calculation interms of order .

(ii) Calculate the residues of at its poles $|z - i| = 2$

COURSE OUTCOME (CO 3) :

1) Finding the Fourier series representation of a periodic function f(x) defined over the interval 0 x 2n.The function is given as follows:

$$\begin{cases} x, & in\ (0,\pi) \\ 2\pi - x & \text{in } (\pi, 2\pi) \end{cases}$$

(i) Determine the period (T) of the function f(x).
(ii) Calculate the coefficients (ao, an, bn) for the Fourier series of f(x).
(iii) Write the Fourier series representation for f(x).

(iv) Deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8}$

2) Suppose we have to find the half - range sine series for the function f(x) = lin the interval (0, l), we need to,

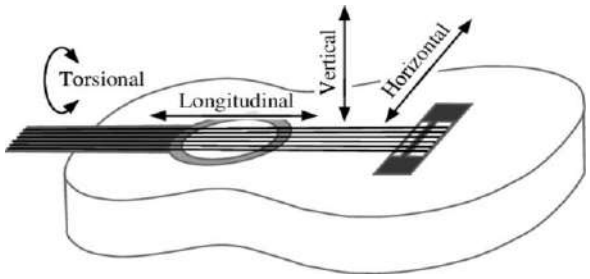
a) Check whether it is odd or even function.

b) Determine the coefficients for the sine series.

COURSE OUTCOME (CO 4):

1) By following this scenario explanation, to determine the steady-state temperature of the rod under the given conditions. One end of the rod of length 10cm is kept at 30°C and other end of the rod is kept at S0°C until steady state condition prevails.

2)The scenario describes the motion of a string that is stretched and fastened at two points x=O and x=l units apart. The motion of the string is initiated by displacing it according to the function $y=k(lx-x^2)$ where y represents the displacement of the string at a given point x, "k" is a constant determining the amplitude of the displacement, and" **l**" is a parameter determining the wave length of the displacement pattern.



i) The equation of motion of the string is --------.
ii) The boundary conditions are---------
iii) The suitable solution is ----------
iv) Apply the boundary conditions and determine the constant values.
v) The most general solution is--------.
v)The equation for the motion of the string using half range sine series is ----------

COURSE OUTCOME (CO 5) :

1) An engineer working on the design of a control system for a mechanical system. The system's behaviour is described by a differential equation involving f(t) which represents a specific input signal, here the system responds based on laplace transform
   (a) if the specific input signal f(t)= $e^{-2t} + t^2$ then describe the system responds
2) How would you apply the Laplace transform to analyze the vibrational response of the mechanical system described by $\frac{e^{-at}-e^{-bt}}{t}$?

CO Vs PO Mapping and CO Vs PSO Mapping:

CO	PO1	PO2	PO3	PO4	POS	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3		2									1		
2	3	2		2									1		
3	3	2		2									1		
4	3	2		2									1		
5	3	2		1									1		

NPTEL/SWAYAM Course:

S.No.	NPTEL Course Name	Instructor	Host Institute
1.	Engineering Mathematics - II	Prof. Jitendra Kumar	IIT Kharagpur

24CS2501	INTRODUCTION TO COMPUTING USING PYTHON	L	T	P	C
		3	0	0	3

Preamble

This course provides learners an insight into Python programming, and develop programming skills to manage the development of software systems. The Python Programming course is designed to equip students with a comprehensive understanding of Python, a versatile and widely-used programming language. Covering fundamentals to advanced topics, this course includes Python syntax, data structures, functions, object-oriented programming, file handling, and database operations. Students will also explore data science libraries, GUI development with Tkinter, Image processing and web development thereby enabling them to apply Python in various real-world scenarios.

Prerequisites for the Course

- **Introduction to programming**

Objectives

1. Understand Python syntax, control flow, and input/output operations proficiently.
2. Apply data structures like lists, tuples, dictionaries, and sets, along with functions including recursion and lambda functions effectively.
3. Master object-oriented programming principles, implementing classes, inheritance, polymorphism, and encapsulation in Python.
4. Manipulate files, handle exceptions, and organize code into modules and packages adeptly.
5. Utilize Python libraries such as NumPy, Pandas, Matplotlib, Tkinter, data analysis, visualization, GUI development, and database interaction with proficiency.

UNIT I	INTRODUCTION TO PYTHON PROGRAMMING	9

Overview of Python Programming language - Python Interpreter and Environment -Basic syntax keywords - Data types- Variables and Identifiers - Statements - Operators- Expression - Input/Output - import statement - Control flow - Decision making - Loop control structure.

UNIT II	DATA STRUCTURES AND FUNCTIONS	9

Data structures : Lists - Tuples - Dictionaries - sets - Stack - Queue - Working with Strings Functions: Definition, Function call, Parameters , return values - Recursion - Anonymous and Lambda Function- Scope of variables

UNIT III	OBJECT ORIENTED PROGRAMMING CONCEPTS	9

Introduction to OOP concepts - Classes - Instance variables - Objects - scopes - namespaces - Inheritance - Polymorphism -Overloading - operator overloading - Overriding - Encapsulation - Class methods, Instance methods and static methods.

UNIT IV	FILES AND MODULES	9

Introduction to Files - File Modes - Reading, Writing Files and appending files- Errors - Handling Exceptions - User-defined and system Exceptions.

Introduction to Modules and Packages - creating and importing modules - Built-in and External modules

UNIT V	PYTHON LIBRARIES AND FRAMEWORKS	9

Data set -Data science libraries - Numpy, Pandas and Matplotlib - Working with Datasets - preprocessing Data sets - Data Analysis and Visualization - GUI programming with Tkinter Library - Data base - Basic operations on Databases - Interfacing Database with GUI - Introduction to web development & Image processing Libraries with python.

Total Periods	**45**

Laboratory Requirements

- 60 Systems with Windows/ LINUX operating system with python IDLE or equivalent.

Suggestive Assessment

Continuous Assessment Test (30 Marks)	Formative Assessment Test (10 Marks)	End Semester Exams (60 Marks)
1. DESCRIPTIVE QUESTIONS 2. Programming Exercises	1. LAB EXPERIMENTS 2. MODEL EXAMINATION	1. DESCRIPTIVE QUESTIONS

Outcomes

Upon completion of the course, the students will be able to:

C01: Apply basic control flow mechanisms, and demonstrate proficiency in performing input/output operations.

CO2: Demonstrate the data structures effectively and implement functions

C03: Apply OOP concepts to design and implement Python classes with appropriate methods and attributes.

C04: Manipulate files, handle exceptions effectively, and organize Python code into modules and packages.

COS: Demonstrate applications using popular Python libraries and frameworks.

Text Books

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Shroff/O'Reilly Publishers, 2016(Unit I -IV)
2. Jake Vander Plas, Python Data Science Handbook, Oreilly Media, First Edition,2016.(Unit V)

Reference Books

1. Charles Dierbach, "Introduction to Computer Science using Python", Wiley India Edition, 2016.
2. David Beazley and Brian K. Jones , "Python Cookbook", Oreilly Media, Third Edition,2013.(Unit V)

Web Resources

1. Python for Data science - https://onlinecourses.nptel.ac.in/noc20_cs36/course (Unit III - Numpy, Pandas)
2. https://www.geeksforgeeks.org(Unit V)

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	POS	P06	P07	POB	P09	P010	P011	P012	PS01	PS02	PS03
1	2	2	2	1	1									3	
2	1	2	1	1	1									3	
3	1	2	1	1	1									3	
4	1	1	1	2	1									2	
5	2	2	2	2	1									2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT1	CAT2	Lab Components	Model Exam	ENDSEM EXAM
REMEMBER	10	10			10
UNDERSTAND	10	10			20
APPLY	80	80	100	100	70
ANALYZE					
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Write a Python Program to read the unit of electricity consumed in a house and calculate the amount to be paid for the electricity consumed. The bill amount should be calculated as per the given specification:
   a. For Oto 100 units the per unit is 0/-
   b. For Oto 200 units, for the first 100 unit the per unit cost is zero and the next 100 units, the consumer shall pay 1.5 per unit.
   c. For Oto 500 units, the consumer shall pay 0 for the first 100 units, for the next 100 units the consumer shall pay 2 per unit, for the next 300 units the unit cost is 't3.00/- (Apply)
2. Chef and Chefina are at positions X and Yon a number line. They both love badminton. It is known that badminton courts are located at every integer point. They want to find a court such that the maximum distance travelled by either of them is **minimized.** Formally, suppose they choose the badminton court at position Z. You need to find the minimum value of max(IX-ZI, IY-Zl)max(IX-Zl,IY-ZI) across all possible choices of Z. Here, IXI denotes absolute value of X. Write a Python Program to Report this minimum value.

   Input Format

   The first line of input will contain a single integer T, denoting the number of test cases.
   Each test case consists of two space-separated integers Xand Y.

   Output Format

   For each test case, output the minimum possible value of \max(IX-ZI, IY-Zl)max(IX-Zl,IY-ZI).

   Constraints

   1:s;T::;1000
   1:s;X,Y:51000
   X<=Y

Sample:

Input

4
3 5
76
110

Output

1
1
5
16

3. Develop a Python Program to Check if a Date is Valid and Print the Incremented Date if it is. (Apply)

COURSE OUTCOME 2:

1. Write a Python Program to Read a Number n and Compute n+nn+nnn. (Apply)
2. Write a program to find Sum of Digit of a Number using Recursion in Python. (Apply)
3. Differentiate break and continue. (Understand)

COURSE OUTCOME 3:

1. Develop Python programs using OOP principles (Understand, Apply)
2. Describe the various features of the Object-Oriented Programming Language. (Understand)
3. Develop a Python program to generate student class to calculate the student performance based on the following criteria: Above 75 percentage as Distinction, 60 to 74 percentage as First Class and Below 60 percentage as Second class. (Apply)
4. Write a Python program to sort set of names stored in an array in alphabetical order. (Apply)

COURSE OUTCOME 4:

1. What happens if the file is not found in the following Python code? (Apply)

```
a=False
while not a:
try:
f_n = input("Enter file name")
i_f = open(f_n, 'r')
except:
print("Input file not found")
```

2. Write a Python Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File. (Apply)
3. Write a Python Program to Extract Numbers from Text File. (Apply)
4. Write a Python Program to merge two files into a third file. (Apply)

COURSE OUTCOME 5:

1. Write a python program to convert RGB image to Black and white Image. (Apply)
2. How will you program GUI with Tkinter Library? Explain. (Understand)

21EE2501	FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

Prerequisites for the course

- Engineering Physics
- Engineering Mathematics

Course Objectives

The course will enable students to:

- Know the basic concepts of electric circuits and analysis and introduction to measurement and metering equipment's for electric circuits
- Gain knowledge on the basic operation of electric machines and transformers.
- Have an Introduction of semiconductor devices and its applications.
- To understand the fundamentals of digital electronics.
- Learn about the basics of communication systems.

UNITI	ELECTRICAL CIRCUITS	9

Ohms Law- Kirchoffs Laws- Steady State Solution of DC Circuits -Mesh and Node Analysis- Introduction to AC Circuits -Operating Principles of Moving Coil and Moving Iron Instruments, Wattmeter and Energy meter.

UNITII	ELECTRICAL MACHINES	9

DC Generator- DC Motor- Single Phase Transformer - single phase induction Motor: Construction, Principle of Operation, EMF Equation and Applications.

UNITIII	SEMICONDUCTORDEVICESANDAPPLICATIONS	9

Characteristics of PN Junction Diode and Zener Diode- Half wave and Full wave Rectifier – Bipolar Junction Transistor: CB, CE, CC Configurations and Characteristics.

UNITIV	DIGITALELECTRONICS	9

Number System -Number System Conversions - Logic Gates- Half and Full Adders-Half Subtractor and Full Subtractor - Introduction to Flip-Flops: SR, JK, T, D.

UNITY	BASICS OF COMMUNICATION SYSTEMS	9

Types of Signals: Analog and Digital Signals - Modulation: Amplitude and Frequency Modulation - Demodulation-Communication Systems: Radio, TV, Satellite (Block Diagram Approach only)

Total Periods	**45**

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
1.DESCRIPTION QUESTIONS 2.FORMATIVE MULTIPLE CHOICE QUESTIONS	1.ASSIGNMENT 2.ONLINE QUIZZES 3.PROBLEM-SOLVING ACTIVITIES	1.DESCRIPTION QUESTIONS 2.FORMATIVE MULTIPLE CHOICE QUESTIONS

CourseOutcomes

Upon completion of the course, the students will be able to:

C01: Apply the basics of electric circuits, analysis, measurement and metering for electric circuits.

CO2: Understand the construction, operating principle of DC machine, single phase transformer and single-phase induction motor.

C03: Understand the basic structure of electronic devices such as diodes, Rectifiers and transistor.

C04: Analyze the various number systems and simplifications using mathematical expression and understand the concepts of flipflops.

COS: Understand the basics of communication systems.

TextBooks

1. R. Muthu subramanian, S. Salivahanan and K A Muraleedharan, "Basic Electrical, Electronics and Computer Engineering",2nd ed., Tata McGraw Hill,2022.
2. R. Sedha, "Applied Electronics", S. Chand & Co., 2019.

ReferenceBooks

1. Mittleand V. N. Mittie, "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 2005.
2. T K Nagsarkarand, M S Sukhija, "Basics of Electrical Engineering", Oxfordpress2005.

WebResources

1. https://nptel.ac.in/courses/108/104/108104139/
2. https://nptel.ac.in/courses/108/105/108105155/
3. https://nptel.ac.in/courses/108/105/108105132/
4. https://nptel.ac.in/courses/117/102/117102061/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	POB	P09	P010	P011	P012	PS 01	PS 02	PS03
1	3	3	3												
2	3	2				2						2			
3	3														
4	3	3	2												
5	3					2						2			

BLOOMS LEVEL ASSESSMENT PATTERN

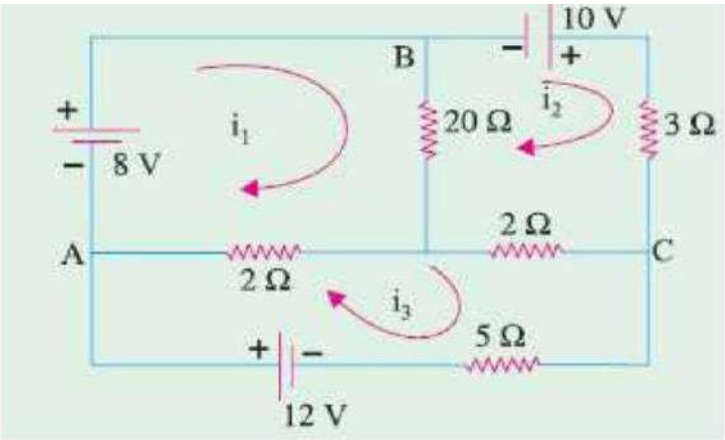
BLOOMS CATEGORY	CAT1	CAT2	FAT1	FAT2	END SEM EXAM
REMEMBER	30	30	05	05	20
UNDERSTAND	20	20	10	10	20
APPLY	20	20	05	05	30
ANALYZE	30	30	05	05	30
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Apply the basic properties of electrical elements, and Analyze AC and DC circuit, and measurement and metering for electric circuits.

1. Classify different electrical measuring equipment's and understanding their principles.

2. Determine current in Sohm resistor by any one method



COURSE OUTCOME 2:

1. Explain operative principle of transformer with background of magnetic circuits.
2. Explain the construction, working principle of single phase Induction motor.

COURSE OUTCOME 3: Understand the utilization of semiconductor devices.

1. Explain CB configuration with the help of input and output characteristics.
2. With a neat diagram explain the working of a PN junction diode in forward bias and

   reverse bias and show the effect of temperature on its V-1 characteristics.

COURSE OUTCOME 4: Understand the fundamentals of digital circuits.

1. Write short notes on i) RS flip flop ii)D- flip flop, iii) JK flip flop, iv)T-flip flop
2. Explain the working of half adder and full adder using truth table.

COURSE OUTCOME 5: Understand the basics of communication systems.

1. Discuss the usage of satellite for long distance communication with a neat block diagram of basic satellite transponder.
2. Explain the types of analog modulation with neat diagrams.

24ME1501	ENGINEERING GRAPHICS	L	T	p	C
		2	0	4	4

Prerequisites for the course

NIL

Preamble

Engineering drawing is an important tool for all Engineers and for many others professionals. It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it.

Objectives

1. To understand the importance of the drawing in Engineering applications.
2. To improve their visualization skills so that they can apply this skill in developing new products.
3. To expose them to existing standards related to technical drawings.
4. To develop graphic skills for communication of concepts, ideas, and design of Engineering Products.

CONCEPTS AND CONVENTION	2

Importance of graphics in Engineering applications - Use of drafting instruments - BIS conventionsand specifications - Size, layout of drawing sheets - Lettering and Dimensioning

UNIT I	PROJECTION OF POINTS, LINES AND PLANES	12

General Principles of orthographic projection - First Angle Projection, projection of points in four quadrants - Projection of straight lines located in the first quadrant - inclined to both planes - Projection of planes (Change of position method only).

UNIT II	PROJECTION OF SOLIDS	10

Projection of simple solids like prisms, pyramids, cylinder, and cone when the axis is inclined to one reference plane by change of position method.

UNIT III	SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES	12

Sections ofregular solids as per BIS conventions - Constructing sectional views of simple objects and components - Development of lateral surfaces ofregular solids-Projection of truncated solids.

UNIT IV	INTERSECTION OF SOLIDS	12

Line of intersection, Determining the line of intersection between surfaces of two interpenetrating two square prisms and Intersection of two cylinders with axes of the solids intersecting each other Perpendicularly, using line method.

UNIT V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	12

Principles of isometric projection, isometric scale, isometric projections of simple solids, truncated prisms, pyramids, cylinders, and cones. Perspective projection of prisms, pyramids, and cylinders by visual ray method.

Text Books

1. Venugopal K. and Prabhu Raja V., "Engineering drawing+ AutoCAD" New Age International (P) Limited (2022)
2. Natrajan KV., "A text book of Engineering Graphics" Dhanalakshmi Publishers, Chennai (2015)

Reference Books

1. N.D.Bhatt, "Engineering Graphics" Charotor Publishing House, 53RD Edition 2019
2. Kumar M.S., "Engineering Graphics" D.D. Publications, (2015)
3. Parthasarathy N.S. and Vela Murali, "Engineering Graphics" Oxford University, Press, New Delhi, (2015)
4. Shah M.B. and Rana B.C., "Engineering Drawing" Pearson Education (2009)

Publication of Bureau of Indian Standards:

1. IS 10711- 2001: Technical products Documentation - Size and lay out of drawing sheets
2. IS 9609 (Parts O and 1) - 2001: Technical products Documentation - Lettering
3. IS 10714 (Part 20) - 2001 and SP 46 - 2003: Lines for technical drawings
4. IS 11669 -1986 and SP 46 - 2003: Dimensioning of Technical Drawings
5. IS 15021 (Parts 1 to 4) - 2001: Technical drawings - Projection Methods

Web Recourses

1. http://nptel.ac.in/ courses/112103019
2. https://archive.nptel.ac.in/courses/112/105/112105294/

Suggestive Assessment Methods

CAT 1 (20Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
CAT 110 MARKS CAT 2 10 MARKS	Assignment, Multiple Choice Questions	Descriptive type Questions

Outcomes

Upon completion of the course, the students will be able to:

COl: Apply the principles of orthographic projection in construction of points, lines and planes
CO2: Apply the principles of change of position method in projection of simple solids
CO3: Develop projections of sectioned solids and their developmental surface.
CO4: Construct the intersection of curves of simple solids
COS: Develop the isometric and perspective view of simple solids.

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO8	PO 9	PO10	PO 11	PO12	PSO1	PSO 2	PSO 3
1	3	1	1	2									3	2	
2	3	1	1	1	1								3	2	
3	3	1	1	1	1								3	2	
4	2	2	1	1	1								3	1	
5	2	2	1	1	1								3	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGOR	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER					
UNDERSTAND			5	5	
APPLY	100	100	10	10	100
ANALYZE			10		
EVALUATE					
CREATE				10	

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Apply the principles of orthographic projection in construction of points, lines and planes

1. Draw the projections of the following points on a common reference line. (Apply) A,35 mm above HP and 25 mm in front of VP
   B,40 mm below HP and 15mm behind VP C,50 mm above HP and 25 mm behind VPD,45 mm below HP and 25 mm behind VPE, 30 mm behind VP and on HP
2. A line CD measuring 80 mm is inclined at an angle of 30° to HP and 45° to VP. The point C is 20 mm above HP and 30 mm in front of VP. Draw the projections of the straight line.(Apply)
3. A pentagon of side 30 mm rests on the ground on one of its corners with the sides containing the corner being equally inclined to the ground. The side opposite to the corner on which it rest is inclined at 30° to the VP and is parallel to the HP. The surface of the pentagon makes 50° with the ground. Draw the top and front views of the pentagon.

COURSE OUTCOME 2: Apply the principles of change of position method in projections of solidproblems and draw graphically

1. A pentagonal pyramid of base side 25mm and height 40 mm, is resting on the ground on one of its triangular faces. The base edge of that face is inclined 300 to VP. Draw the projections of the solid. (A)

2. A hexagonal prism has side 25mm and height 50mm has a corner of its base on the ground and the long edge containing that corner inclined at 300 to HP and 450 to VP. Draw the projections of the solid. (A)

COURSE OUTCOME 3: Develop projections of sectioned solids and their developmental surface.

1. A cylinder of base diameter 50mm and height 60mm rest on its base on HP. It is cut by a plane perpendicular to VP and inclined at 450 to HP. The cutting plane meets the axis at a distance 15mm from its top base. Draw the sectional plan and true shape of the section. (A)

2. A regular hexagonal pyramid side of base 30 mm and height 60 mm is vertically on its base

on HP, such that two of its sides of the base are perpendicular to VP. It is cut by a plane inclined at 30° to HP and perpendicular to VP. The cutting plane bisects the axis of the pyramid. Obtain the development of the lateral surface of the truncated pyramid. (A)

COURSE OUTCOME 4: Construct the intersection of curves of simple solids

1. A square prism 30 mm base sides and 70mm axis is completely penetrated by another square prism of 25 mm sides and 70 mm axis, horizontally. Both axes Intersects and bisect each other. All faces of prisms are equally inclined to VP. Draw projections showing curves of intersections.

2. A vertical cylinder of 80 mm diameter is completely penetrated by another cylinder of 60 mm diameter, their axes bisecting each other at right angles. Draw their projections showing curves of penetration, assuming the axis of the penetrating cylinder to be parallel to the VP.

COURSE OUTCOME 5: Develop the isometric and perspective view of simple solids.

1. A cone of diameter SO mm and axis 70 mm rests on its base on HP. A section plane perpendicular to VP and inclined at 30° to HP cuts the solid and passes through a point on axis which is 40 mm above HP. Draw the isometric view of a truncated cone. (A)

2. A pentagonal pyramid of base edge 25 mm and height 65 mm rests vertically on its base on the HP such that one of its base edge parallel to VP. It is cut by a plane, parallel to HP and perpendicular to VP and passes through a point 25 mm from the apex. Draw the isometric view of the frustum of pyramid. (A)

24GE2901	DESIGN THINKING	L	T	P	C
		1	0	0	1

Preamble

The course Design thinking help the learners to transform the way developing products, services, processes, and organizations. It brings innovative solutions to life based on how real users think, feel and behave.

Prerequisites for the course

Nil

Objectives

- Understand the importance of design thinking concepts and principles
- Use design thinking methods in every stage of the problem
- Create prototypes for clear understanding of the problem statement.
- Learn the different testing phases of design thinking
- Apply various methods in design thinking to different industrial problems

UNIT I	INTRODUCTION	3
Need for design - Tools - Principles of Design Thinking - The process of Design Thinking - Planning a Design Thinking project.		
UNIT II	**PROBLEM ANALYSIS AND DEFINITION**	3
Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Methods for Empathetic Design.		
UNIT III	**IDEATION AND PROTOTYPING**	3
Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Start-up Method for Prototype Development - Visualization and presentation techniques.		
UNIT IV	**TESTING AND IMPLEMENTATION**	3
Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking.		
UNITV	**DESIGN THINKING IN INDUSTRY**	**3**
Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow - Case Study.		
	Total Periods	**15**

Suggestive Assessment Methods

Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
DESCRIPTIVE QUESTIONS	1. ASSIGNMENT 2. MCQ	DESCRIPTIVE QUESTIONS

Outcomes

Upon completion of the course, the students will be able to:

CO1- Understand the key concepts of design thinking.

CO2- Apply design thinking in the problem analysis phase.

CO3- Apply design thinking in the ideate and innovate phase of problem solving.

CO4- Apply design thinking in the testing and implementation phase.

COS- Apply innovative solutions to real world problems using industry standards.

Text Books

1. Nir Eyal. Edited by Ryan Hoover, Hooked- How To Build Habit-Forming Products, Published by Portfolio, 2014.
2. Judkins Rod, The Art of Creative Thinking, Hodder & Stoughton, 2015.

Reference Books

1. Dan Senor, Saul Singer, Start-up Nation, Hachette Book Group, 2009.
2. Simon Sinek, Start with Why, Self-help book, 2009.

Web Resources

1. https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them
2. https://www.youtube.com/watch?v=GNvLpfXCge8
3. https://www.coursera.org/lecture/patient-safety-project-planning/prototyping-phase-jVuQ

CO Vs. PO Mapping and CO vs. PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PS O3
1	3		3								3		2		1
2		3	3	3									3		1
3	2	3	3	1	1								2		1
4	1		2	2	1	1	1	1	1		1	1	3		1
5	2		2				2	2	2		2		3		1

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER					
UNDERSTAND	70	70	70	70	
APPLY	30	30	30	30	
ANALYZE					
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1):

1. Identify a real-world problem and describe how applying design thinking could lead to a better solution than traditional problem-solving methods.
2. Demonstrate how a specific design thinking tool (e.g., empathy mapping) can be applied to understand user needs in the context of a mobile banking app.

Course Outcome 2 (CO2):

1. Using the empathetic design method, conduct an observation phase to identify key pain points in the user experience of a public transportation system. How would you reformulate these pain points into actionable problem statements?
2. Clarify a problem faced by remote workers during virtual meetings by determining the search field and analyzing the problem. Propose an empathetic design method to develop a solution.

Course Outcome 3 (CO3):

1. In the ideate phase, utilize at least two creativity techniques to generate solutions for reducing food waste in restaurants. How would you evaluate these ideas to select the most viable one?
2. Apply the lean start-up method to develop a prototype for a new fitness app. How would you use visualization and presentation techniques to effectively communicate your prototype to potential investors?

Course Outcome 4 (CO4):

1. Design a desirability test for a new smart home device using the Kano Model. What steps would you take to gather user feedback, and how would you analyze the results to inform design improvements?
2. Plan a user testing workshop to evaluate a new educational app. What are the space and material requirements, and how would you ensure agility in adapting the workshop based on real-time feedback?

Course Outcome 5 (CO5):

1. How can a corporation integrate design thinking into its strategy to address a new social contract with its employees focused on remote work and well-being? Provide an example of a specific initiative and outline the steps taken.
2. Analyze a case study where design activism played a crucial role in driving social change. How were design thinking principles applied to achieve the desired outcomes?

24HS2103	TECHNOLOGY IN TAMIL CULTURE	L	T	P	C
		2	0	0	1

Preamble:
This course is offered to develop technical thinking based on Tamil tradition and to acquaint students with the fundamentals of various technologies through Tamil culture and history.

Prerequisite: The prerequisite knowledge required to study this course is basic knowledge in English and Tamil Heritage.

UNIT I	WEAVING AND CERAMIC TECHNOLOGY	6

Weaving Industry during Sangam Age–Ceramic technology–Black and Red Ware Potteries (BRW) – Graffition Potteries

UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY	6

Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero Stones of Sangam Age– Details of Stage Constructions in Silapathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal -Chetti Nadu Houses, Indo –Saracenic architecture at Madras during British Period.

UNIT III	MANUFACTURING TECHNOLOGY	6

Art of Ship Building - Metallurgical studies- art of Jewelry making - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads -Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gemstone types described in Silapathikaram.

UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	6

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea – Fisheries – Pearl-Conceiving-Ancient Knowledge of Ocean-Knowledge Specific Society.

UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING	6

Development of Scientific Tamil – Tamil computing–Digitalization of Tamil Books–Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sekai Project.

Total Periods	30

Assessment Method

Continuous Assessment 1	Continuous Assessment 2
50 marks	50 marks

Course Outcomes:

At the end of the course the students will be able to

CO1	To learn the techniques adopted in Industries of ancient Tamil culture.
CO2	To assess the technical competence of ancient Tamil.
CO3	To achieve the ability to think about various production technologies in Tamil Culture.
CO4	To explore the recovery and development of agricultural and water management technical skills of Tamil culture.
CO5	To enumerate the technical development that Tamil has achieved in the field of science and computer.

CO PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12
1								**1**	**2**	**3**	**1**	**3**
2								**1**	**3**	**2**	**3**	**2**
3								**1**	**3**	**2**	**1**	**2**
4								**3**	**2**	**2**	**3**	**2**
5								**2**	**3**	**3**	**2**	**3**

TEXT-CUM-REFERENCEBOOKS

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL–(in print)
2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5. Keeladi-'Sangam City Civilization on the bank of river Vaigai'(Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published By: TheAuthor)
7. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) Journey of Civilization Industo Vaigai (R.Balakrishnan) (Published by:RMRL)–Reference Book

24HS2103	தமிழரும் ததொழில் நுட்பமும்	L	T	P	C
		2	0	0	1

முன் னுரை (Preamble)

இந்தப் பாடத்திட்டம் பபாறியியல் பயிலும் முதலாம் ஆண் டு மாணவரக் ளின் இரண் டாம் பருவத்திற்குரியது. தமிழ் மரபு சார்ந்த பதாழில் நுட்ப சிந்தனனனய வளரத் ்து பல் வவறு பதாழில் நுட்பங் களின் அடிப்பனட கூறுகனளத் தமிழரின் பண் பாடு மற்றும் வரலாற்றின் மூலம் மாணவரக் னள அறியச் பசய்தல்.

பொடதெறிக்கொன முன் ெ்ிபெ்தரனகள் (Prerequisites for the course)

தமிழ் பமாழியில் எழுத படிக்க பதரிந்திருத்தல் அவசியம்.

அலகு I	தெசவு மற்றும் பொரனத் ததொழில் நுட்பம்	6

சங் க காலத்தில் பநசவுத்பதாழில் - பானனத் பதாழில் நுட்பம் - கருப்பு சிவப்பு பாண் டங் கள் - பாண் டங் களில் கீறல் குறியீடுகள்

அலகு II	வடிவரமப்பு மற்றும் கட்டிடத் ததொழில் நுட்பம்	6

சங் க காலத்தில் வடிவனமப்பு மற்றும் கட்டுமானங் கள் & சங் க காலத்தில் வீட்டுப் பபாருட்களில் வடிவனமப்பு - சங் க காலத்தில் கட்டுமான பபாருட்களும் நடுகல் லும் - சிலப்பதிகாரத்தில் வமனட அனமப்பு பற்றிய விவரங் கள் - மாமல் லபுரச் சிற்பங் களும் , வகாவில் களும் - வசாழர் காலத்து பபருங் வகாயில் கள் மற்றும் பிற வழிபாட்டுத்தலங் கள் - நாயக்கர் காலக் வகாயில் கள் - மாதிரி கட்டனமப்புகள் பற்றி அறிதல் , மதுனர மீனாட்சி அம் மன் ஆலயம் மற்றும் திருமனல நாயக்கர் மஹால் - பசட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் பசன் னனயில் இந்வதா - சாவராபசனிக் கட்டிடக்கனல

அலகு III	உற்பத்தித் ததொழில் நுட்பம்	6

கப்பல் கட்டும் கனல - உவலாகவியல் - நனகத் பதாழில் நுட்பம் - இரும் பு பதாழிற்சானல - இரும் னப உருக்குதல் , எஃகு - வரலாற்று சான் றுகளாக பசம்பு மற்றும் தங் க நாணயங் கள் - நாணயங் கள் அச்சடித்தல் - மணி உருவாக்கும் பதாழிற்சானலகள் - கல் மணிகள் கண் ணாடி மணிகள் - சுடுமண் மணிகள் - சங் கு மணிகள் - எலும்பு துண் டுகள் - பதால் லியல் சான் றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வனககள்

அலகு IV	வவளொண் ரம மற்றும் ெ்ீனை்் பொசன ததொழில் நுட்பம்	6

அனண , ஏரி, குளங் கள் , மதகு - வசாழரக் ாலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால் நனட பராமரிப்பு - கால் நனடகளுக்காக வடிவனமக்கப்பட்ட கிணறுகள் - வவளாண் னம மற்றும் வவளாண் னமச் சார்ந்த பசயல் பாடுகள் - கடல் சார் அறிவு - மீன் வளம் - முத்து மற்றும் முத்து குளித்தல் - பபருங் கடல் குறித்த பண் னடய அறிவு - அறிவுசார் சமூகம்

அலகு V	அறிவியல் தமிழ் மற்றும் கணினித் தமிழ்	6

அறிவியல் தமிழின் வளரச் ்சி - கணினித் தமிழ் வளரச் ்சி - தமிழ் நூல் கனள மின் பதிப்பு பசய் தல் - தமிழ் பமன் பபாருட்கள் உருவாக்கம் - தமிழ் இனணய கல் விக்கழகம் - தமிழ் மின் நூலகம் - இனணயத்தில் தமிழ் அகராதிகள் - பசாற்குனவத் திட்டம்.

Total Periods	30
Assessment Method	
Continuous Assessment 1	**Continuous Assessment 2**
50 marks	**50 marks**

எதிை்பொை்க்கும் படிப்பின் முடிவுகள்

CO1	மாணவரக் ள் பண் னடத் தமிழரின் பதாழில்நுட்பங் கனள அறிந்து பகாள்வர்.
CO2	பண் னடத் தமிழரின் பதாழில்நுட்பத் திறனன மதிப்பிடுதல்.
CO3	தாய் பமாழியில் பல்வவறு உற்பத்தி பதாழில்நுட்பங் கனளக் குறித்து சிந்திக்கும் திறனன அனடவார்.
CO4	தமிழரின் வவளாண் னம மற்றும் நீ ர் வமலாண் னம பதாழில்நுட்ப திறன் கனள மீட்டு உருவாக்கம் பசய் தல் குறித்து அறிதல்.
CO5	அறிவியல் மற்றும் கணினி துனறயில் தமிழ்ப் பபற்றுள்ள பதாழில் நுட்ப வளரச் ்சினய அறிதல்.

Course Outcomes:

At the end of the course the students will be able to

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1		1			1		1	1	2	1		3
2		2	2		2	1	3	2	1	2		2
3		2	3	1	2	1	1	1	2	1		2
4			2				2	1	2	2		2
5			2				1	2	1	3		1

TEXT – CUM – REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண் பாடும் - வக.வக பிள்னள (பவளியீடு: தமிழ் நாடு பாடநூல் மற்றும் கல் வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனனவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி - னவனக நதிக்கனரயில் சங் க கால நகர நாகரிகம் (பதால் லியல் துனற பவளியீடு).
4. பபாருனந - ஆற்றங் கனர நாகரிகம் (பதால் லியல் துனற பவளியீடு)

24AI2611	ARTIFICIAL INTELLIGENCE TOOLS LABORATORY	L	T	P	C
		0	0	4	2

The goal of the AI tools lab is to provide familiarity with AI tools for professional applications, its purpose, and perhaps some key features or benefits it offers.

Prerequisites for the course

- **NIL**

Objectives

1. Understanding the complex AI concepts to non-technical stakeholders through presentations,reports, and visualizations.
2. Engage in practical exercises and projects that involve data visualization and dashboardingtools involves designing, implementing, and deploying AI models.
3. To analyze and interpret images and videos, such as facial recognition or object detection.
4. To deploy AI models training, evaluation and optimization.
5. To Apply AI techniques to solve real world problems

S.No	List of Experiments	CO
1	Converting idea to customized presentation, technical paperwith plagiarism checking using slideAI, neo-gpt	CO1
2	Bug fixing and trouble shooting with Codeium	CO1
3	Creating Dashboards using Google data studio	CO2
4	Creating interactive dashboard for business applicationusing PowerBI	CO2
5	Creating interactive multilingual chat bot for customerservice using Google dialog flow	CO2
6	Object Detection using Google's Teachable machine	CO3
7	Motion Detection using Google's teachable machine	CO3
8	ML application development and code generation usingvertex AI – classification/ prediction/associations	CO4
9	Building AI Personal Trainer with IBM Watson anddeployment in webapp	CO4
10	Web application development for disease prediction usingstreamlit	CO5
11	Personalized recommendation system using streamlit	CO5

S.No.	List of Projects	PO	CO
1.	Plagiarism Grammar checking for content writing.	PO1,PO5	CO1
2.	Code Review Assistance	PO1,PO5	CO2
3.	Customer Dashboard Creation	PO1,PO5	CO2
4.	User queries Chatbot Creation	PO1,PO5	CO2
5.	Stock prediction	PO1,PO5	CO3
6.	Consumer sentiment analysis	PO1,PO5	CO3
7.	Handwritten digit recognition	PO1,PO5	CO4
8.	Spam email classifier	PO1,PO5	CO4

9.	Fake news detector	PO1,PO5	CO5
10.	Coupon purchase prediction	PO1,PO5	CO5

Suggestive Assessment Methods

Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**
• Project File(Progress Score) • Viva voce	1. Record note 2. Exercises 3. Viva voce

Course Outcomes

Upon completion of the course, the students will be able to:

CO1	Improve the ability to communicate complex AI concepts to non-technical stakeholders through presentations, reports, visualizations and automated codegenerations.
CO2	Develop critical thinking skills to evaluate visualization in data and dashboardingtools for content and debugging solutions effectively.
CO3	Use AI to analyze and interpret images and videos, such as facial recognition orobject detection.
CO4	Engage in practical exercises and projects that involve designing, implementing, and deploying AI models. This includes data preprocessing, model training, evaluation, and optimization
CO5	Apply AI techniques to solve real-world problems across various domains such as healthcare, finance, marketing, and more. Emphasis on problem-solving, critical thinking, and innovation.

Laboratory Requirements

- C compiler
- System with windows
- Internet

Reference Books

1. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig

Web Resources

1. https://www.ibm.com/products/app-connect/integrate-data?utm_content
2. https://findmyaitool.com/category/resources
3. https://openai.com/

24CS2511	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

Prerequisites for the course

- 24CS1511 – Programming Practice Laboratory using C

Objectives

1. To build python programming skills for real-world applications.
2. To develop Python programs with conditionals and loops.
3. To use Python data structures - lists, tuples, dictionaries.
4. To do input/output with files in Python.
5. To develop collaboration skills by working in teams on projects

S.No	List of Experiments	CO
1	Basic Python Programming a) Write a program that takes 2 numbers as command line arguments and prints its sum. b) Implement python script to show the usage of various operators available in python language.	**CO1**
2	Python Programs using conditionals – if, if – else, if – elif – else statements a) Write a program for checking the given number is even or odd. b) Write a program for finding biggest number among 3 numbers c) Implement python script to read person's age from keyboard and display whether he is eligible for voting or not. d) Implement python script to check the given year is leap year or not	**CO2**
3	Python Programs using looping statements a) Implement Python Script to generate first N natural numbers. b) Implement Python Script to check given number is palindrome or not. c) Implement Python script to print factorial of a number. d)Implement Python Script to check given number is Armstrong or not.	**CO2**
4	Python Programs using Functions a) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them. b) Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between 1000 and 2000.	**CO2**

5	Python Programs using List a) Write a program which accepts a sequence of comma - separated numbers from console and generate a list and a tuple which contains every number. Suppose the following input is supplied to the program: 34, 67, 55, 33, 12, 98. Then, the output should be: ['34', '67', '55', '33', '12', '98'] ('34',67', '55', '33', '12', '98').	**CO3**
6	Python Programs using String, Tuples, Numpy array. a) Accepts a string and calculate the number of upper case letters and lower case letters. b) Write a python program to check whether the given string is palindrome or not. c) Create all possible strings by using 'a', 'e', 'i', 'o', 'u'. Use the characters exactly once. d) Multiply all the numbers in a list.	**CO3**
7	Python Programs using Dictionary a) Create a dictionary and apply the following methods 1) Print the dictionary items 2) access items 3) use get() 4)change values 5) use len()	**CO3**
8	Python Programs using Files a) Write Python script to display file contents. b) Write Python script to copy file contents from one file to another.	**CO4**
9	Programs to implement Inheritance.	**CO4**
10	Python Programs using Exceptions	**CO3**
11	Calculation of the Area : Don't measure	**CO3**
12	Monte Hall : 3 doors and a twist	**CO3**
13	Sorting : Arrange the books	**CO3**
14	Searching : Find in seconds	**CO3**
15	Anagram	**CO2**
16	Lottery Simulation - Profit or Loss	**CO3**
17	Simulate a password generator	**CO3**
18	Simulate a grade book for a teacher	**CO2**
19	Rock Paper and Scissor.	**CO2**
20	Converting an Image to Black and White/Grayscale	**CO5**
21	Blurring an Image, Edge Detection and Reducing the Image Size	**CO5**

S.No.	**List of Projects**	**Related**	**CO**

		Experiment	
1.	Currency Conversion system	EXP 1,2,7,11	CO1-CO5
2.	ATM System	EXP1,2,8,9,11	CO1-CO5
3.	Airline Reservation System	EXP 1,2,3,6,7,8,9,11	CO1-CO5
4.	Library Management System	EXP 1,2,3,4,5,6,7,8,9,11	CO1-CO5
5.	Restaurant Billing System	EXP 1,2,3,4,6,7,8,9,11	CO1-CO5
6.	Inventory System	EXP 1,2,3,4,5,6,7,8,9,11	CO1-CO5
7.	College management system	EXP 1,2,3,4,6,7,8,9,11	CO1-CO5
8.	Number Guessing Game	EXP 1,2,3,6,7,8,9,10,11	CO1-CO5
9.	Electricity billing system	EXP 1,2,3,6,7,8,9,11	CO1-CO5
10.	Healthcare management System	EXP 1,2,3,4,5,6,7,8,9,11	CO1-CO5
11.	Blood Donation System	EXP 1,2,3,6,7,8,9,11	CO1-CO5
12.	Quiz Application	EXP 1,2,3,4,6,7,8,9,11	CO1-CO5
13.	Stock management system	EXP 1,2,3,4,5,6,7,8,9,11	CO1-CO5
14.	Payroll Management System	EXP 1,2,3,6,7,8,9,11	CO1-CO5
15.	Exam Seating Arrangement System	EXP 1,2,3,6,7,8,9,11	CO1-CO5

Suggestive Assessment Methods

Lab Components Assessments (60 Marks)	**End Semester Exams (40 Marks)**
1. Exercises (Hacker rank score) **2. Project File (Progress Score)** **3. Viva voce**	**1. Record note** **2. Exercises** **3. Viva voce**

Outcomes

Upon completion of the course, the students will be able to:

CO1	Write simple Python programs for solving problems using conditional statements.
CO2	Write Python programs for solving problems using looping statement and list and decompose a Python program into functions.

CO3	Represent data using Python strings, arrays, tuples, dictionaries and solve computational problems using them and use Numpy and Pandas libraries in real time applications.
CO4	Read and write data from/to files in Python programs and handle exceptions while dealing with data.
CO5	Apply the power of graphics for processing images.

Laboratory Requirements

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH:

HARDWARE:

Intel Desktop Systems: 36 nos

Printers: 02

SOFTWARE:

Microsoft Windows 10

Net Beans 8.0.2, JDK 7.0.

Reference Books

1. ReemaThareja, "Python Programming: Using Problem Solving Approach", Oxford University Press, 2017.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", SecondEdition,Shroff/O'Reilly Publishers, 2016
3. José M. Garrido, "Introduction to Computational Models with Python", CRC Press, 2015.

Web Resources

1. https://searchapparchitecture.techtarget.com/definition/python-programminghttps://en.wikipedia.org/wiki/python_programming
2. https://www.geeksforgeeks.org/ python-programming/
3. https://www.webopedia.com/TERM/O/python _programming

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2					2	1	1		1	3	3	2
2	3	2	2					2	1	1		1	3	3	2
3	3	2	2					2	1	1		1	3	3	2
4	3	2	2					2	1	1		1	3	3	2
5	3	2	2					2	1	1		1	3	3	2

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Write a Python Program to read the unit of electricity consumed in a house and calculate the amount to be paid for the electricity consumed. The bill amount should be calculated as per the given specification:

a. For 0 to 100 units the per unit is ₹ 0/-

b. For 0 to 200 units, for the first 100 unit the per unit cost is zero and the next 100 units, the consumer shall pay ₹ 1.5 per unit.

c. For 0 to 500 units, the consumer shall pay ₹ 0 for the first 100 units, for the next 100 units the consumer shall pay ₹ 2 per unit, for the next 300 units the unit cost is ₹3.00/-

(Apply)

2. Chef and Chefina are at positions X and Y on a number line. They both love badminton. It is known that badminton courts are located at every integer point. They want to find a court such that the maximum distance travelled by either of them is minimized. Formally, suppose they choose the badminton court at position Z. You need to find the minimum value of max (|X-Z|, |Y-Z|)max(|X−Z|,|Y−Z|) across all possible choices of Z. Here, |X| denotes absolute value of X. Write a Python Program to Report this minimum value.

Input Format

The first line of input will contain a single integer T, denoting the number of test cases.
Each test case consists of two space-separated integers Xand Y.
Output Format
For each test case, output the minimum possible value of \max(|X-Z|, |Y-Z|)max(|X−Z|,|Y−Z|).
Constraints
1≤T≤1000
1≤X,Y≤1000
X<=Y

Sample :

Input

```
4
3 5
7 6
1 10
```

Output

```
1
1
5
16
```

3. Develop a Python Program to Check if a Date is Valid and Print the Incremented Date if it is.

(Apply)

COURSE OUTCOME 2:

Write a Python Program to Read a Number n and Compute n+nn+nnn. (Apply)

1. Write a program to find Sum of Digit of a Number using Recursion in Python. (Apply)
2. Differentiate break and continue. (Understand)

COURSE OUTCOME 3:

Develop Python programs using OOP principles (Understand, Apply)

1. Describe the various features of the Object-Oriented Programming Language. (Understand)
2. Develop a Python program to generate student class to calculate the student performance based on the following criteria: Above 75 percentage as Distinction, 60 to 74 percentage as First Class and Below 60 percentage as Second class. (Apply)
3. Write a Python program to sort set of names stored in an array in alphabetical order. (Apply)

COURSE OUTCOME 4:

What happens if the file is not found in the following Python code? (Apply)

```
a=False
while not a:
try:
f_n = input("Enter file name")
i_f = open(f_n, 'r')
except:
print("Input file not found")
```

Write a Python Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File. (Apply)

Write a Python Program to Extract Numbers from Text File. (Apply)

Write a Python Program to merge two files into a third file. (Apply)

COURSE OUTCOME 5:

1. Write a python program to convert RGB image to Black and white Image. (Apply)
2. How will you program GUI with Tkinter Library?Explain. (Understand)

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF WEEKS REQUIRED
1.	Program to implement Variables , Data Types	1st week
2.	Programs to implement Control Structures	1st week
3.	Programs to implement Functions and Modules	2nd week
4.	Programs to implement Strings	2nd week
5.	Programs to implement List Manipulation	3rd week
6.	Program using Tuples, Sets, and Dictionaries	3rd week

7.	Program to implement String Operations	4th week
8.	Implementing simple OOP concepts in Python	4th week
9.	Program using File Handling	5th week
10.	Program using Exception Handling	5th week
11.	Program to implement Libraries and Frameworks	6th week
12.	Program using Packages	6th week